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The PHOTOFACT Servicer

January 29, 1951 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ Vol. 13, Nos. 121 & 122

"The only exercise some people get is jumping to conclusions." - Anon.

DOOR KNOB HANGERS

Because so many of you have asked, we are repeating our offer of a year ago.

You are entitled to receive 100 business-getting door-knob hangers FREE. If you want more, the following prices will prevail:

100 . . . . . No Charge
200 . . . . . $1.00
500 . . . . . $2.50
750 . . . . . $3.75
1000 . . . . . $5.00

There is a big space for you to imprint your name, address and telephone number - a space easy to fill with an ordinary rubber stamp.

This offer is good as long as the new supply lasts.

Simply write and mention this issue of the Servicer.

Howard W. Sams

* * *

Here's a contribution well worth the $5.00 we offer for new ideas on "How to use PHOTOFACTS."

"A number of subscribers have advanced many systems of cross referencing the service hints in the Servicers to the individual folders. However, none of them have indicated how they handle those service hints which do not carry a reference to the particular folder covering the model. There are about two hundred of these. I list them on a sheet of foolscap paper. Then, each time I receive a new Cumulative Index, I go over this sheet and fill in numbers for those included in each new index and then I go back and make proper notations on the individual folders. In this way, I have cross indexed almost two hundred, leaving only about sixty for which no folder numbers have been furnished.

"Another trick that I use is to list in a small book, all items of interest in each issue of the Servicer. Not an elaborate system, but it works very well. The other day, two of my friends were talking about using AM generators for checking IF's on TV. One of them had a recollection that somewhere in Sams' literature there was an item on it. But where? Instead of running through all the Servicers, I just opened my index and in less than a minute I had them reading the article.

"Season's greetings to all the staff."

Marcus H. Moses, B. S. (E. E.)
35 Hamilton Place
New York 31, N. Y.

Many thanks, Mr. Moses. Our check for $5.00 is enroute to you.

* * *

PF (Photofact) INDEX and TECHNICAL DIGEST No. 24

It is with pardonable pride that the Servicer calls attention to the first issue of the PF (Photofact) INDEX and TECHNICAL DIGEST, included with PHOTOFACT Set 121.

The first issue contains 56 pages and sets a precedent in that it carries editorial content and advertising. The major article in this issue is devoted to a general discussion of television tuning systems - their construction and characteristics, and specific treatments of the General Instrument Models 45A and 45B, the Sarkes Tarzian Model TT3, and the Standard Coil Models TV 100 through TV 103, TV 201 and TV 203. Complete alignment instructions representing the most up-to-date techniques are included, and a section of the article is devoted to general television tuner service considerations.

Additionally, we feel fortunate in being able to include articles by three of the foremost writers in the electronic field:

First: Walter R. Jones, associate Professor Electrical Engineering, Cornell University, presents his timely comments in "As I See It."

Second: "Shop Talk" - by Milton S. Kiver, President of Television Communications Institute, whose first article outlines his objectives and presents a timely review on the article "Servicing Selenium Rectifiers," appearing initially in "Service Magazine" of November, 1949.

Third: John Markus, Editor in Chief, McGraw-Hill Radio Servicing Library, presents his thoughts on "Dollar and Sense Servicing."

We want to take this opportunity to acknowledge the splendid cooperation which we have received from

everyone in making it possible for us to produce this publication. The encouragement and suggestions which we received from all segments of the industry - service technicians, radio parts distributors, receiver and component manufacturers, and technical publishing companies - have certainly made our job a lot easier.

Naturally, we are enthusiastic about our premiere effort in the PF (Photofact) INDEX and TECHNICAL DIGEST, and even more elated about the plans for future issues. We sincerely hope that it meets our consistent objective of supplying genuinely helpful information to the service field.

Tell your friends about the PF (Photofact) INDEX and TECHNICAL DIGEST. They may obtain a copy with PHOTOFACT Set No. 121, or from their favorite parts jobber.

Your comments and suggestions will be appreciated.

- J. R. R.

* * *

A REVIEW OF 1950

By Robert C. Sprague
President, Radio-Television Manufacturers Ass'n.
President, Sprague Electric Co., North Adams, Mass.

"The radio-television industry in 1950 experienced its greatest year of peacetime production, sales, and expansion. Its record of achievement will likely stand for some time due to the increasing mobilization of the industry for military purposes.

While the final year-end figures are not yet available, it appears certain now that the following records have been established:

Greatest dollar volume in industry's peacetime history.

Largest production of sets and their components.

Most rapid rate of acceleration in production and sales.

1950 PRODUCTION (51 Weeks)	
TV	RADIO
7,402,724	14,186,499

The Service Business Should Be Good!

The industry's greatest commercial developments, of course, have occurred in the field of television. By producing close to 7,500 TV sets - more than twice the output of 1949 - and by a healthy production of more than 14,000,000 radios, manufacturers raised their year's billings of radio and television sets alone to about $1.7 billion. This represents a rise of over 90 percent above the previous year's sales and of 125 percent above 1948's record.

The remarkable thing about this achievement is that the greatest output occurred in the second half of the year in the face of a color controversy, shortages, bottlenecks, new excise taxes, tighter credit restrictions, and mounting military requirements.

At the peak of the fall boom, the industry was producing television receivers at an annual rate of 17,000,000 units. Thus, in numbers alone and without taking into account the higher values of TV sets, the industry's production record stands unchallenged.

While over-shadowed by television, production and sales of radios should have been encouraging to both AM and FM broadcasters. The industry's output of over 14,000,000 radios of all types surpassed its greatest prewar record, reached in 1941 before the commercial manufacture of television sets had begun.

The entire output of the radio-television industry, when military production, transmitting and communications equipment, and replacement parts are included, exceeded $2.2 billion by a good margin, at manufacturers' prices, with retail values totalling more than $3 billion.

These production records were made possible by the courage and far-sightedness of manufacturers, both of components and end equipment, and their willingness to make large expenditures for research and sales promotions and to plow back profits into extensive plant expansions. Had the Korean War not altered the whole economy of our country, this would have brought about greater industrial growth and a continuing increase in the television audience.

Of course, the Korean War and subsequent international developments have quickly changed the industry's outlook for 1951, as it has that of every business and every person.

No one at this time can predict with accuracy what the civilian production of the radio-television industry will be during the next 12 months, or perhaps even during the next three months. Certainly, civilian production will decline sharply due to growing shortages of vital raw materials needed both by the military and our civilian economy. The degree of this cutback, of course, will depend upon the extent of the increasing military requirements.

The radio industry has frequently demonstrated its ability to adapt itself to rapidly changing circumstances, and I am confident it will do so now if given half a chance. Conservation measures and substitutions of less scarce materials for those in shortest supply will, no doubt, keep civilian production going at a higher rate than might seem possible on the basis of materials available.

But bottlenecks have already slowed down the industry from its record-breaking pace of the past few months, and more slowdowns and some difficult adjustments are ahead.

It is highly important, however, and I believe officials of the National Production Authority and of the Department of National Defense realize it, that our industry be allowed enough materials to continue operations on a sizeable scale until defense orders can take up the slack in civilian production.

The electronics industry, which is just another name for the radio-television industry, is one of the most

vital industries upon which our whole national defense program rests. Without electronics equipment and parts, there could be no rearmament for modern warfare. Electronics gear goes into virtually every weapon used by American fighting men, into all radar, all proximity fuses, and into all aircraft and mobile vehicles, aboard all naval vessels, and into many other implements of war.

Our industry did a magnificent job in World War II, producing $7.5 billion worth of radio and electronics equipment and parts. Due to postwar expansion, we are now prepared to do a much bigger job for the national defense.

Meanwhile, I can assure you - the service technician - as well as the public, that the radio-television industry will do its utmost to produce as much civilian goods as possible, including needed replacement parts, throughout this national emergency."

* * *

FIELD EXPERIENCES -

For every "Field Experience" published, we issue a certificate good for one PHOTOFACT Folder Set. Awards are issued at the time of publication. Since it is impossible to verify the accuracy of contributions, we cannot be responsible for either the diagnosis made of the receiver trouble, or the results which will be obtained by following the suggested repair routine. All contributions become the property of Howard W. Sams & Co., Inc.

* * *

MAJESTIC Model 12C4
Photofact Set No. 108, Folder No. 7

Complaint: Sound but no light on picture tube. No high voltage.

Cause: C68 shorted, putting 250 volts on the grid of the horizontal multivibrator through the horizontal phase inverter tube. This rendered the horizontal multivibrator and following stages inoperative, resulting in no high voltage.

Remedy: Replace C68 (.05) and set is returned to normal.

Fred M. Wiglurz
64 Webster Street
Pawtucket, R. I.

* * *

DUMONT Model RA 105
Photofact Set No. 72, Folder No. 8

Complaint: Picture distorted. Vertical and horizontal sync unstable. Or a complaint of fading picture. Sound okay.

Analysis: First check the 6AT6 automatic gain control tube. If this tube is good, and removing it restores the picture, change the 100K 2 watt resistor connected to the cathode (pin 2) to a new 100K 2 watt resistor. This resistor heats up and changes value causing the AGC to block the video signal.

ALL DUMONT SETS

Complaint: Weak or snowy channel 13. (Metropolitan New York area installations where Channel 13 signal is usually strong.) This has all the earmarks of antenna trouble particularly since all other channels will appear normal in signal intensity. Before you knock yourself out on the antenna, change the 6J6 oscillator tube with one that is known to be good.

Editor's Note: Both above Field Experiences were submitted by:

Henry W. Finch
North Jersey Electronics
441 Orchard Street
Englewood, N. J.

* * *

GENERAL ELECTRIC TV Model 810
Photofact Set No. 53, Folder No. 12

Complaint: Picture decreases in height after few minutes of operation.

Cause and Remedy: Rectifier V21 - low emission. Replace.

TRUETONE Model D2819
Photofact Set No. 35, Folder No. 24

Complaint: Low distorted sound.

Cause: Positive bias on AGC string caused by leak across fixed trimmers of first IF AM transformer, Item No. 64. Indication of about 50 volts positive.

Remedy: Remove cover and clean top and bottom of trimmers with carbon tetrachloride.

Editor's Note: Both above Field Experiences were submitted by:

J. W. Smith
The Radio Shack
1602 West Pratt Street
Baltimore 23, Maryland

* * *

GENERAL ELECTRIC Model 817 and 821
Photofact Set No. 78, Folder No. 7

Insufficient "drive" in these chassis will be caused by the two 200 mil. selenium rectifiers slowly deteriorating so that the B+ is beginning to drop. As much as 20 volts less on the horizontal oscillator 12SN7 will cause the "drive" to narrow so that the width control will have little effect. Also, watch for a low-emission 19BG6, which has the same effect as aging rectifiers. When replacing the rectifiers, discard the fibre insulation around the units so that air circulation will be improved, and prolong the life of the selenium rectifiers.

GENERAL ELECTRIC Model 818
Photofact Set No. 95A, Folder No. 7

Complaint: Very poor focus at the extreme rotation of the front-panel control.

Analysis: This model is very similar to the 817 and

821 chassis, except that a 25L6 is used as a "focus control." Perfect focus was achieved in the center of the control by changing the R376 39K (G.E. service data) 25L6 screen dropping resistor to a value of near 50K. Use a one watt resistor. I found that perfect focus is also determined by the line voltage; the 50K resistor was determined at a nominal line voltage of 115 volts.

Editor's Note: Both above Field Experiences were submitted by:

Horace Descartes Westbrooks
117 West Solomon Street
Griffin, Georgia

* * *

MOTOROLA Model 12T1
Photofact Set No. 92, Folder No. 4

Complaint: No picture and low audio.

Analysis and Repair: A B+ voltage check across capacitor, Item C2A, revealed only approximately 115 volts DC. Further check revealed that rectifier M-1 was not functioning properly and remedy was affected by replacing rectifier.

MOTOROLA VT 73
Photofact Set No. 71, Folder No. 12

Complaint: Narrow picture and horizontal instability.

Analysis and Repair: Voltages checked low on 12SN7 (V13). Associated resistors and capacitors checked okay. Resistance check to chassis ground showed 10,000 ohm resistance between the horizontal AFC portion of the tube and ground. The reading should be 470,000 ohms. One terminal of T3 was shorted against one of the grounded mounting terminals.

Removing the short effected the repair.

RCA Model 9T240, Chassis KCS28
Photofact Set No. 74, Folder No. 8

Complaint: No picture nor sound. Raster normal.

Cause: Faulty 12AU7 video amplifier.

Analysis: The defective 12AU7 caused the AGC rectifier (6SN7) to clamp AGC line, causing the RF and IF strips to be biased to cutoff.

GENERAL SERVICE HINT:

Several receivers have been serviced recently on which the complaint was horizontal tear accompanied by persistent noise in the sound. The condition exhibited all the characteristics of high voltage breakdown or corona discharge. Examination in the usual manner for this type of fault failed to show any defects. Replacement of the 500 mmf., 20,000 volt capacitor cleared the trouble. As this component is one of the least likely to fail and ordinarily would not be suspected because of the presence of high voltage, much time can be wasted in hunting for the arc-over. A spare capacitor with short, well-insulated clip leads makes it possible to check this capacitor in the receiver.

MOTOROLA Model 14T1, Chassis TS88
Photofact Set No. 112, Folder No. 6

Complaint: Intermittent operation accompanied by noise caused by voltage breakdown. As soon as the chassis was removed from the cabinet and turned on its side for service, the breakdown stopped and the set operated perfectly.

Method of Locating Trouble: A voltmeter was attached to the B+ line. Each tube and component was lightly tapped with an insulated screwdriver. Trouble was finally located in resistor R98, which is a 5 ohm, 5 watt surge limiting resistor on top of the chassis. An inspection of the unit showed no defect, and when cold, the resistance value was correct. Further handling of the resistor showed that only the outside coating was holding the unit together and that the wire was actually broken inside. Upon heating, of course the resistor would become intermittent and cause the trouble noted above. Replacement of the resistor effected the repair.

RAYTHEON Model M1101
Photofact Set No. 94, Folder No. 8

Complaint: No control over brightness.

Analysis and Repair: Checking the brightness control with an ohmmeter revealed that even though the element was still good, the arm was making intermittent contact and causing the trouble. Replacement of the control restored the receiver to normal operation.

MOTOROLA Model 17T1

Complaint: Picture smeared - - poor contrast - - poor sound.

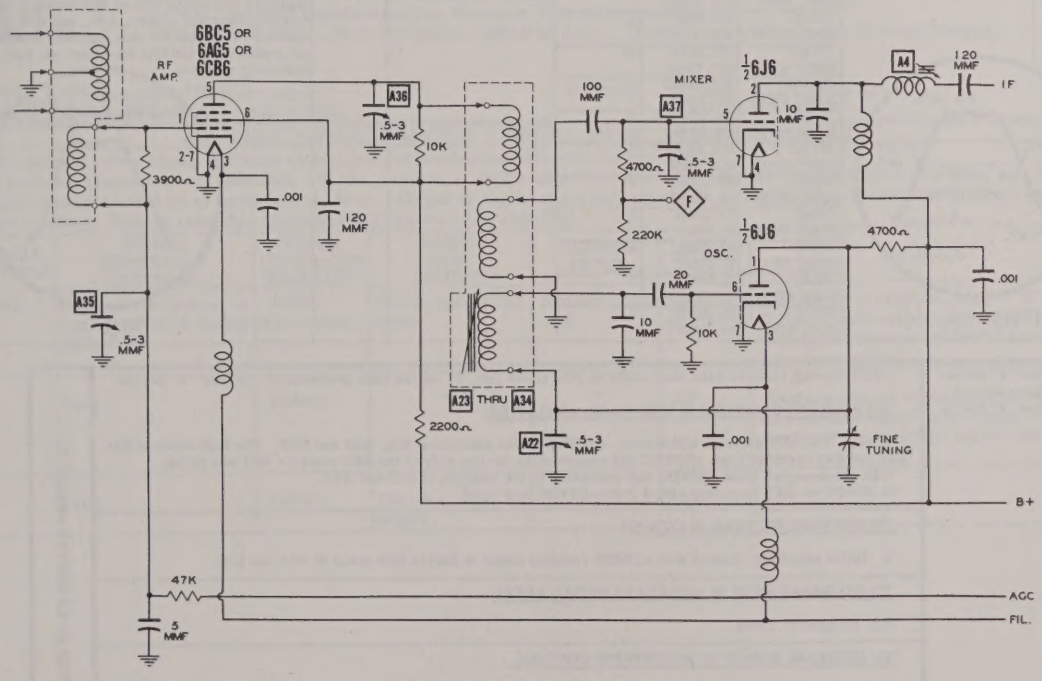
Analysis and Reapir: By switching the receiver to unused channels, streaks on the picture tube indicated the presence of regeneration. The use of a sweep generator and oscilloscope indicated that the IF pattern was okay, but that the mixer pattern was too narrow. The mixer coil on this receiver is aligned both at top and bottom, and a realignment in accordance with the service manual eliminated the trouble. This improved the definition and contrast although the apparent overall sensitivity was somewhat reduced.

Editor's Note: Above Field Experiences were contributed by:

Field Service Section
Howard W. Sams & Co., Inc.

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 3 SET 112

Run "2" Series	Production changes on the CX-33 chassis, production run series 2, and the CX-33F chassis were covered in Photofact folder 3, set 112.
Run "3" Series	The following changes have been made or added to sets coded production run "3". An adjacent channel sound trap part number 650275A-1 added in series with a 1.5MMF capacitor from the plate of V4, the 1st Video IF Amplifier, to ground. A .047MFD capacitor added from junction of R32 and R36 to ground R49 and C38 removed. R84 connected to the opposite side of the filter choke L1. R9 and R104 removed. R77 changed to 470K. R79 changed to 560K. C74 changed to .0047MFD. C70 changed to .001MFD. C25 changed to .0047MFD. R23 removed. R24 changed to 4KΩ and connected to +205VDC line. R30 changed to 22KΩ A 1500MMF capacitor added from +205VDC line to ground. The tuner was changed to a turret type employing two tubes. The tuner part number is 850103A. The models and chassis included in these production changes are model 320-B, -M (Ch. CX-33L), models 321-B, -M, 322-B, -M, 324-M, 325-F, -M (Ch. CX-33), model 326-M (Ch. CX-33L), model 332-B, -M, 334-M (Ch. CX-33F). A schematic for this tuner is given below.



CONTINUED ON REVERSE SIDE.

CAPEHART MODELS 320-B, -M (Ch. CX-33L), MODELS 321-B, -M, 322-B, -M, 324-M, 325-F, -M (Ch. CX-33), MODEL 326-M (Ch. CX-33L), MODEL 332-B, -M, 334M (Ch. CX-33F)

PRODUCTION CHANGES
BULLETIN 13

PRODUCTION CHANGES
BULLETIN 13

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SUPPLEMENTAL ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

VIDEO IF ALIGNMENT

In the models covered by this production change bulletin the video IF bandpass has been increased to about 3.5MC and alignment frequencies of two of the IF coils have been changed. The coil in the mixer output stage (located on the tuner) should be peaked at 23.0MC (A4). A2 should be peaked at 25.8MC. The co-channel sound trap that has been added in the plate circuit of the lst IF amplifier is located directly in back of V4. It should be adjusted for minimum response at 21.75MC with the signal injected at the mixer grid and the VTVM reading taken across R39. The overall response curve is shown in figure 1A.

OSCILLATOR ALIGNMENT

See notes under oscillator alignment in PHOTOFACT.
The individual channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is tunnel to each channel.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. amp. to point A . Low side to chassis.	A22	Set channel 13 slug (A23) to the center of its range. Adjust A22 to place video marker at 50% as shown in figure 4.
9.	"	"	207MC (10MC SWP)	205.25MC 209.75 MC	12	"	A24	Adjust the individual channel oscillator slugs to place video marker at 50% as per figure 4. If any adjustment shows insufficient range, a compromise adjustment of A22 will be required. If A22 is changed it will be necessary to readjust all channels.
			201MC (10MC SWP)	199.25 MC 203.75 MC	11		A25	
			195MC (10MC SWP)	193.25 MC 197.75 MC	10		A26	
			189MC (10MC SWP)	187.25MC 191.75MC	9		A27	
			183MC (10MC SWP)	181.25MC 185.75MC	8		A28	
			177MC (10MC SWP)	175.25MC 179.75MC	7		A29	
			85MC (10MC SWP)	83.25MC 87.75MC	6		A30	
			79MC (10MC SWP)	77.25MC 81.75MC	5		A31	
			69MC (10MC SWP)	67.25MC 71.75MC	4		A32	
			63MC (10MC SWP)	61.25MC 65.75MC	3		A33	
			57MC (10MC SWP)	55.25MC 59.75MC	2		A34	

RF AND MIXER ALIGNMENT

Short the AGC line to chassis.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	20. MC (10MC SWP)	205.25MC 209.75MC	12	Vert. amp. thru 10KΩ to point F . Low side to chassis.	A35, A36, A37	Adjust for response curve similar to figure 5 with marker above 90%.
11.	"	"	213MC (10MC SWP)	211.25 MC 215.75MC	13	"		Check for response similar to figure 5. If markers fall below 70% on any channel, make slight adjustment of A35, A36, and A37 with channel switch set for that channel. Recheck all channels to see that they have not been seriously affected.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25 MC 179.75MC	7			
			85MC (10MC SWP)	83.25MC 87.75MC	6			
			79MC (10MC SWP)	77.25MC 81.75MC	5			
			69MC (10MC SWP)	67.25MC 71.75MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

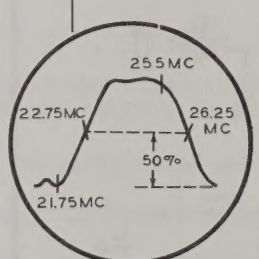


FIG. 1A

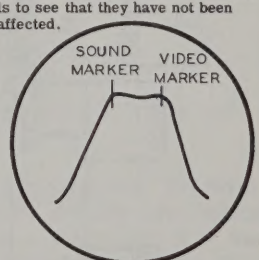
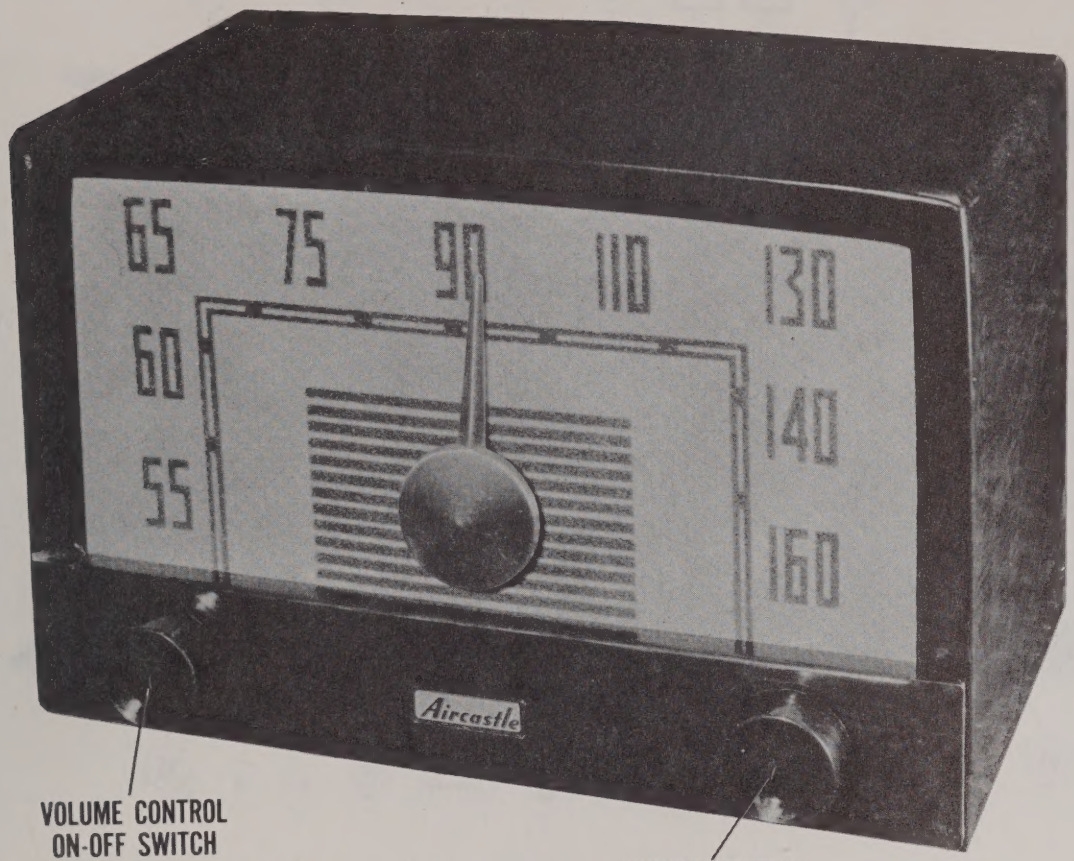


FIG. 5

Run "3" Series (Late Prod.), Run "4" Series	The following changes have been made to sets coded run "3" series (late production), and run "4" series. TO PREVENT BLOCKING IN THE VIDEO AMPLIFIER A 5KΩ, 7W, WW resistor added from +205VDC to the junction of R41, R42 and R43. The high sides of R41, R42 and R43 removed from +115VDC and connected to the low side of the 5KΩ resistor that was added. C3A disconnected from +115VDC and connected to the junction of R42 and R43. A 20MFD at 450V capacitor added from +115VDC to ground. TO PREVENT PICTURE BLOOMING A .1MFD capacitor shunted with a 100KΩ resistor added in series with pin 11 of V24 and L13. TO DECREASE SNOW IN MODERATE SIGNAL AREAS R25 changed to 2 Meg. TO INCREASE RANGE OF BRIGHTNESS CONTROL R2 changed to 200KΩ R43 changed to 68KΩ TO IMPROVE HORIZONTAL PICTURE PHASING C70 changed to .001MFD R91 changed to 100KΩ	CAPEHART CHASSIS CX-33 (Continued)



AIRCASTLE
MODELS 607-314, 607-315

AIRCASTLE
MODELS 607-314, 607-315

AIRCASTLE MODEL 607-314

TRADE NAME	Aircastle, Models 607-314, 607-315
MANUFACTURER	Speigel Inc., 1061 W. 35 St., Chicago, Illinois
TYPE SET	AC-DC Operated Superheterodyne Receiver With Loop Antenna
TUBES (SIX)	Types 12AU6 Mixer, 6C4 Oscillator, 12BA6 IF Amp., 12AV6 Det.-AVC-AF, 50C5 Power Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning cap fully closed and set pointer parallel with base of dial. Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to stator on rear section of tuning gang.	455KC (400 ∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	Tune for max. output	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		AIRCASTLE PART No.	STANDARD REPLACEMENT		
V1	Mixer	12AU6	12AU6	7BK	
V2	Oscillator	6C4	6C4	6BG	
V3	IF Amp.	12BA6	12BA6	7BK	
V4	Det.-AVC-AF	12AV6	12AV6	7BT	
V5	Power Output	50C5	50C5	7BZ	
V6	Rectifier	35W4	35W4	5BC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	AIRCASTLE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	150	N-5051	PRS150/40-40		EDL-4415		TVA-2445	Filter Blue
B	40	150							Filter red
C2	.05	200	N-1345	P288-05	DF-503	PTE4S5		2TM-S5	Isolation
C3	.05	200	N-1345	P288-05	DF-503	PTE4S5		2TM-S5	AVC Filter
C4	.01	400	N-1344	P488-01	D6-103	PTE4S1	821-01	4TM-S1	RF Coupling
C5	.05	200	N-1345	P288-05	DF-503	PTE4S5		2TM-S5	Conv. Dec.
C6	100		N-6015	SI100	D6-101	5W5T1	GP1K-100	19C11	Diode RF Filter
C7	.005	600	N-4894	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C8	250		N-6488	SI250	D6-251	5W5T25	GP2K-250	1FM-325	AF Amp. Plate
C9	.01	400	N-1344	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C10	.02	400	N-1376	P488-02	DF-203	PTE4S2		4TM-S2	Output Plate Bypass
C11	.08	200	N-8092	P288-1	DF-104	PTE4P1		72P52	Line Isolation
C12	.05	400	N-1346	P488-05	DF-503	PTE4S5		4TM-S5	Rect. Plate Bypass

CONTROLS

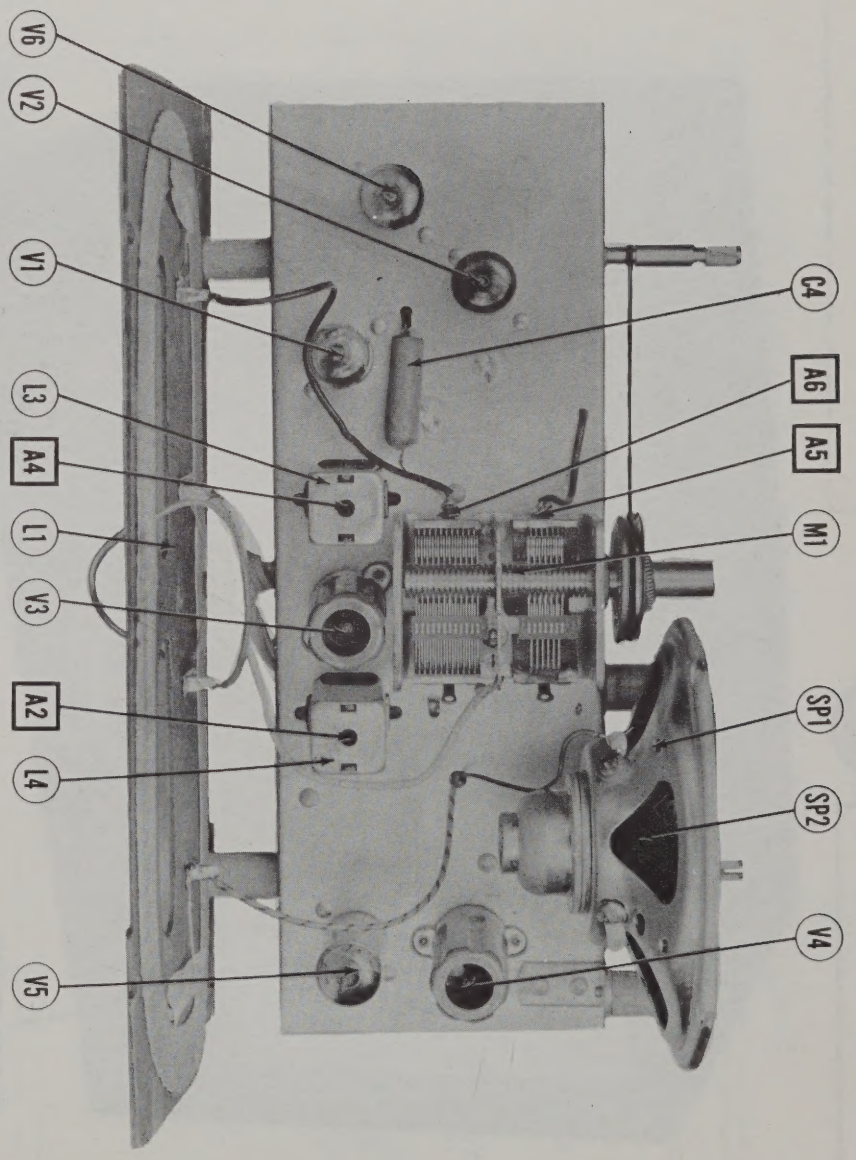
ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	AIRCASTLE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	500KΩ	½	N7984	Q13-133	AM-60-Z	AN-60	Volume control
B	Shaft		Not req.	Not req.	KSS-3	AK-4	Attach to R1A per instructions
C	Switch		Not req.	76-1	SW-A	K-155	Attach to R1A per instructions.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	AIRCASTLE PART No.	IRC PART No.	
R2	2.7Meg	½			Conv. Grid - See Note 1.
R3	39KΩ	½			Conv. Decoup - See Note 2.
R4	39KΩ	½			Osc. Grid - See Note 2.
R5	68Ω	½	N-6485		IF Amp. Cathode
R6	1Meg	2	N-1262	BTB-1Meg	AVC Network
R7	6.8Meg	½	N-4028	BTS-6.8Meg	AF Amp. Grid
R8	330KΩ	½		BTS-330K	AF Amp. Plate - See Note 3.
R9	470KΩ	½	N-4027	BTS-470K	Output Grid
R10	180Ω	½	N-4067	BTS-180	Output Cathode - See Note 4
R11	1000Ω	½	N-3341	BTS-1000	Filter - See Note 5.

Note 1. Some models use 3.3meg resistor in this application.
Note 2. Some models use 47KΩ resistor in this application.
Note 3. Some models use 220KΩ resistor in this application.
Note 4. Some models use resistors in parallel to obtain desired value.
Note 5. Some models use resistors in series to obtain desired value.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		AIRCASTLE PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2KΩ	3Ω	160Ω tap ⓐ 6Ω	.3Ω	N-8001	A-3330	A-3031	RO-3	

SPEAKER

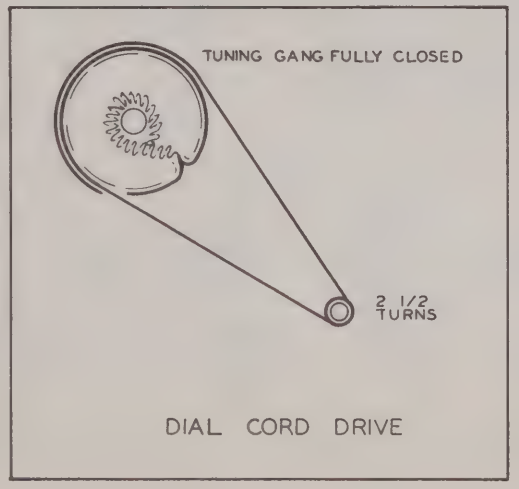
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			AIRCASTLE PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-105		
SP1	PM	3Ω	N-7980	Mod. P5-X	5A07	
	CONE DIA.	V. C. DIA.				
SP2	4 1/2 '	9/16"				

R F COILS

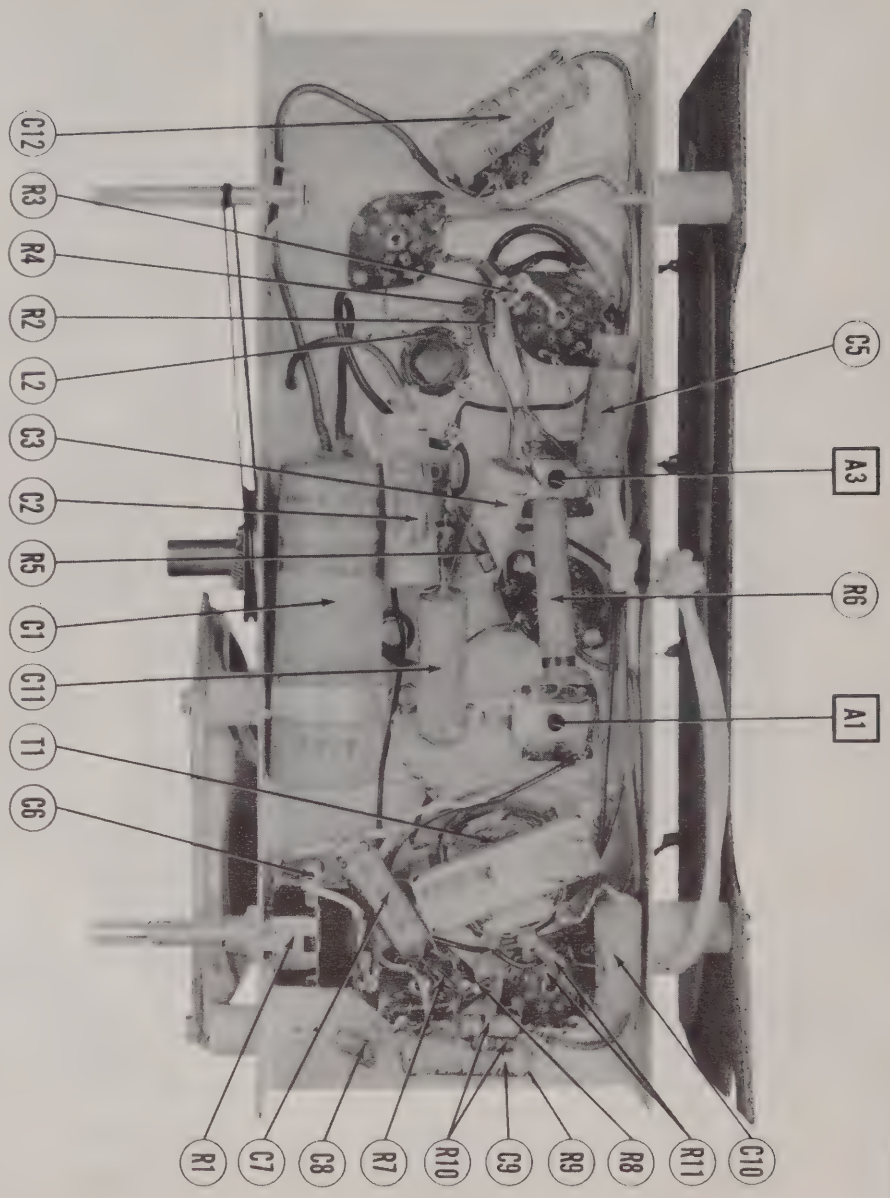
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	AIRCASTLE PART No.	MEISSNER PART No.	
L1	Loop Antenna	.2Ω	2.4Ω	N-8002		Includes Cabinet Back
L2	Osc. Coil	5.4Ω	8.2Ω	N-7982	14-1073	
L3	1st IF	18Ω	18Ω	N-7981	16-6758	
L4	2nd IF	18Ω	18Ω	N-7981	16-6758	

MISCELLANEOUS

ITEM No.	PART NAME	AIRCASTLE PART No.	NOTES
M1	2 gang var. cap	N-8045	(23-397MMF, 20-153MMF)
	Cabinet	#315	Model 607-315
	Cabinet	#314	Model 607-314
	Knob	N-8004	Model 607-315
	Knob	N-8003	Model 607-314
	Dial Pointer	N-7994	



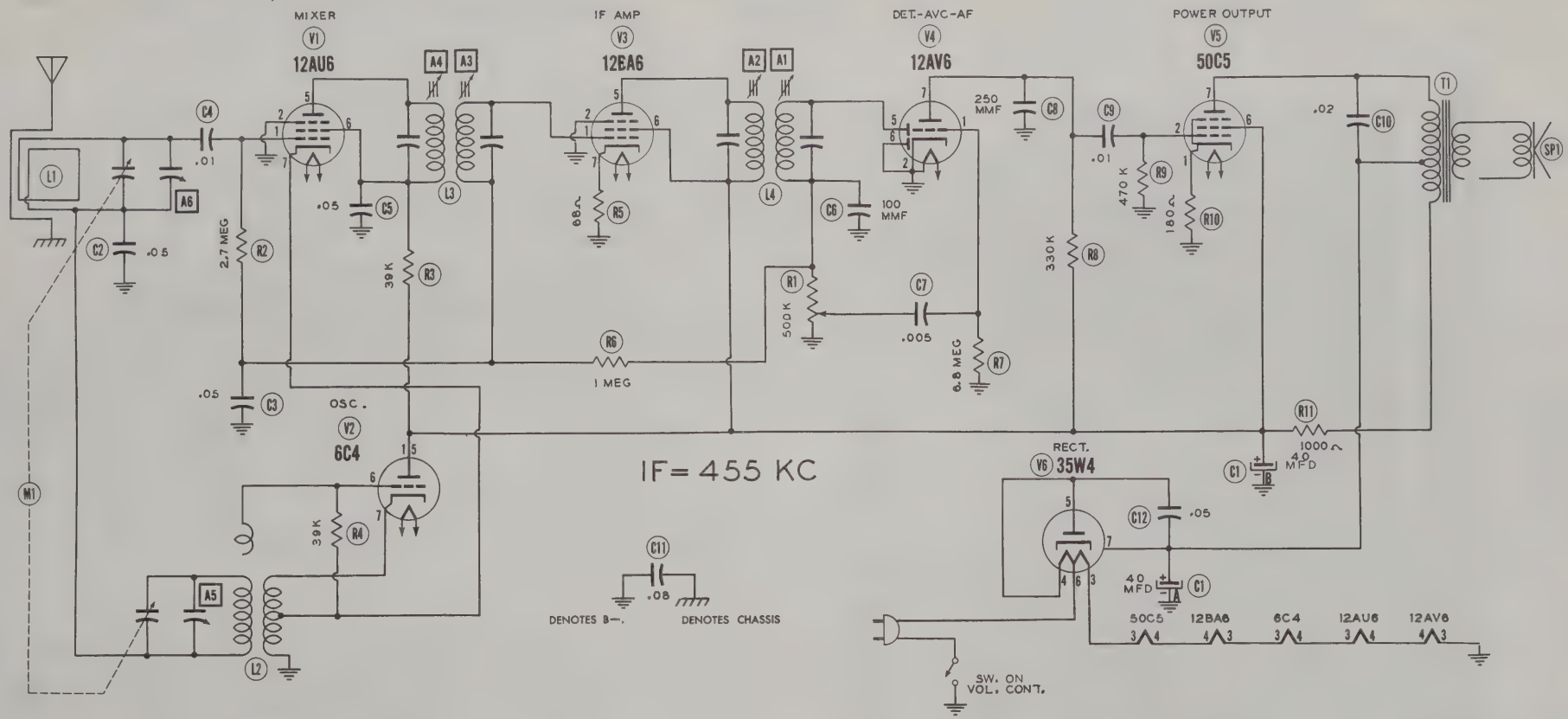
CHASSIS—BOTTOM VIEW



SET 122 FOLDER 2

AIRCASTLE MODEL 607-314

AIRCASTLE MODEL 607-314



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	-2VDC	0V	24VAC	12VAC	50VDC	50VDC	0V
V 2	6C4	100VDC	0V	30VAC	24VAC	100VDC	§-28VDC	0V
V 3	12BA6	-.4VDC	0V	30VAC	40VAC	100VDC	100VDC	.8VDC
V 4	12AV6	-.7VDC	0V	0V	12VAC	-1.4VDC	0V	65VDC
V 5	50C5	7.3VDC	0V	87VAC	40VAC	0V	100VDC	110VDC
V 6	35W4	0V	0V	87VAC	112VAC	112VAC	117VAC	115VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12AU6	4.2Meg	0Ω	25Ω	13Ω	†40KΩ	†40KΩ	.5Ω
V 2	6C4	†1KΩ	Inf.	30Ω	25Ω	†1KΩ	39KΩ	5.4Ω
V 3	12BA6	1.5Meg	0Ω	30Ω	40Ω	†1KΩ	†1KΩ	68Ω
V 4	12AV6	6.8Meg	0Ω	0Ω	13Ω	500KΩ	0Ω	†330KΩ
V 5	50C5	180Ω	470KΩ	90Ω	40Ω	470KΩ	†1KΩ	†155Ω
V 6	35W4	Inf.	Inf.	90Ω	120Ω	120Ω	130Ω	30KΩ

† MEASURED FROM PIN 7 OF V6

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

CRESCENT
MODEL H-19 Series "STENO"

Figure 1

CRESCENT
MODEL H-19 Series "STENO"

"STENO"
GENERAL INFORMATION

The "Steno" Model H-19 Series Crescent Wire Recorder is a self-contained unit that records on the wire and plays back through its own speaker or earphone. The "Steno" incorporates a program register (Cue Meter) which enables the operator to accurately time and meter dictation or recording on the wire. The mechanical unit is equipped with a solenoid which, in conjunction with the push buttons, insures quick and positive action (forward or reverse) to the mechanism. Automatic breaking action, to avoid wire spillage and shorten coasting time, is also a function of the solenoid. An automatic shutoff switch, working with the plastic tape leaders (which are attached to each end of the wire), shuts off the mechanical unit when the end of the wire is reached in either direction. The "Steno" may also be used as an "Interkom" when the Remote Station is connected to the "Steno."

Manufactured by

CRESCENT INDUSTRIES, INC.

4140 WEST BELMONT AVENUE, CHICAGO 41, ILLINOIS

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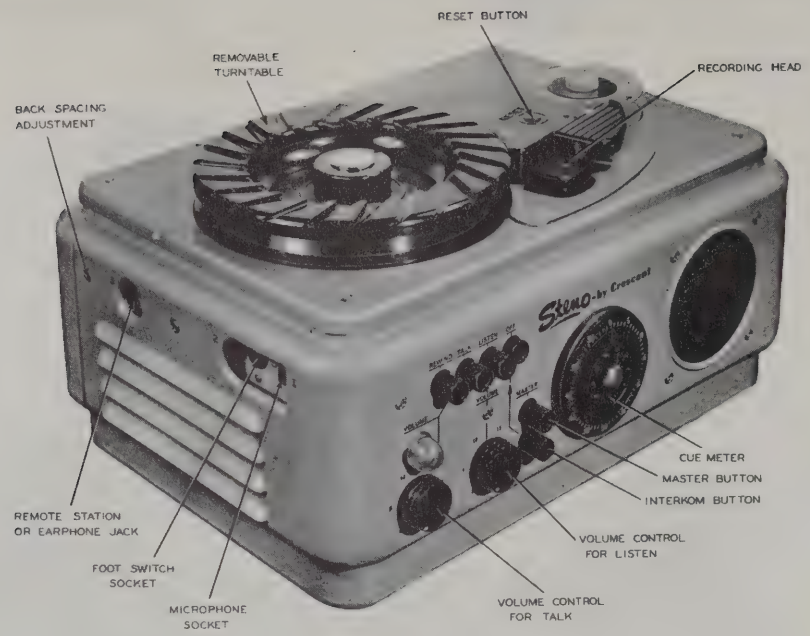


Figure 2

OPERATING INSTRUCTIONS

Placing the "Steno" in Operation -

1. Connect one end of the power cord through the opening in the rear of the case and plug the other end into a convenient wall receptacle of the proper rating.

2. Insert the microphone plug into its proper place at the left end of the machine (both plug and opening are marked No. 1).

3. Connect the Foot Switch to its proper place (both plug and opening are marked No. 2).

4. Check the position of the outer dial of the "Cue Meter" on the front of the machine. If the outer dial setting is at 59, it is necessary to rotate the inner dial clockwise so that it coincides with the outer dial. Then both should be moved to, or past, the zero location together.

5. Press the Master Button on the front panel, and the red Reset Button on the switch housing of the mechanical unit.

6. Depress the Rewind Button on the front panel. As soon as the tubes have warmed up, the Rewind Hub on top, at the right end of the machine, will revolve, and the Recording Head will move up and down. Stop the Recording Head at the top of its travel. This is done by drawing a finger over the small lever appearing in a slot located near the Reset Button.

7. Unwind approximately 2 inches of the tape leader from a spool of Crescent Recording Wire. Place the spool (label-side up) on the Rewind Hub and press on the Storage Spool until it is firmly seated.

8. Grasp the end of the tape and carefully pull it past the Recording Head. Place the tape leader in the channel in the large drum. While holding the leader against the inner edge of the channel, rotate the turntable, by hand, until two complete turns of wire are in the channel. The full length of the leader must be pressed against the inner surface of the channel, or speed variations or wire tangle may result. Make sure the wire is in the groove of the Recording Head.

NOTE: If the instructions have been carefully followed, the Rewind Button should still be depressed, the red Reset Button tripped, and the Master Button depressed. Now press the Talk Button, then the Reset Button. Now set the Timer so that the indicator marks on both dials are at Zero. The machine is now ready for complete automatic operation, and the top cover may be replaced.

To Dictate -

1. Press the Talk Button. Hold the microphone in your hand at about the distance you would normally expect to use, or set it on its desk stand (accessory) at the distance which will be most convenient for your normal dictation.

2. Press the Microphone Switch and start talking in a normal voice.

3. Adjust Talk Volume Control, located directly beneath the Neon Volume Indicator, until the light flashes only on the high peaks of your voice. The "Steno" is now properly adjusted and should need no further attention.

NOTE: The Microphone Switch may be used in either of two ways:

1. It may be pressed in and held for a short time, or -

2. It may be pressed in and up into the locked position for a long as the user desires.

3. In dictating several letters on a spool of Crescent Wire, it has been found highly advantageous

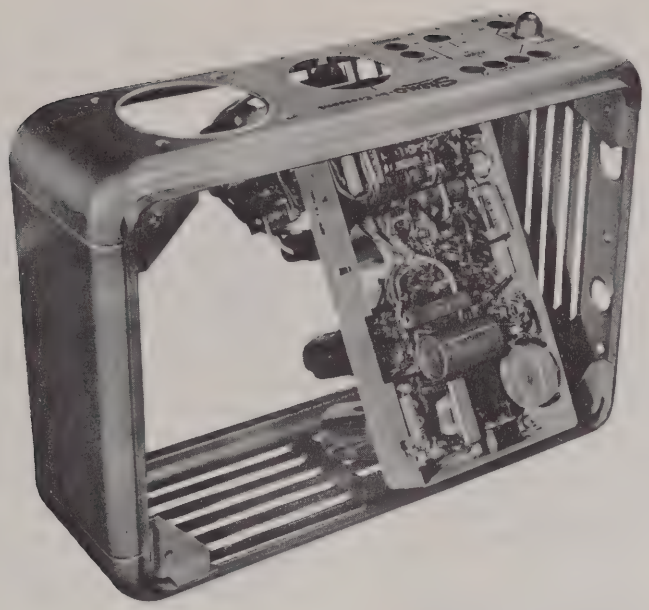


Figure 3. Removing Amplifier From Case

to use the Recording Time Pad which is included with each machine. The Record Time Pads have three columns: "M" - minutes; "S" - seconds, and "Remarks." At the beginning of each dictation, the time in minutes and seconds should be edited. From these dial readings, the secretary or stenographer knows the length of each dictated letter and how to locate it properly on the sheet of letterhead paper.

When an error is made during dictation, it may be corrected in the following manner:

(a) Press the Rewind Button and allow the machine to rewind until the timer has passed the place where the mistake was made.

(b) Press the Listen Button:

(c) Press the Foot Switch or Microphone Switch. Adjust the Listen Volume Control (located immediately to the left of the Master and Interkom Push Buttons), and listen to the recording until you have come to the exact word or sentence to be changed.

(d) Press the Talk Button and speak into the Microphone as described before. The previous message will be erased as the new message is spoken.

It is necessary to press the Talk Button before releasing the Foot Switch or Microphone Switch in order to prevent operation of the automatic back-space. Neglecting this will cause erasure of a word or more of the previously dictated message.

To Rewind -

If the dictation is finished for the moment and the user wishes to rewind the entire recording, press the Rewind Button. As soon as the timer has reached the zero position, the machine will shut off automatically, but, due to the fast rewind speed, it will coast backward until the timer reads approximately 59 minutes, 55 seconds.

If it is desired to take the wire completely off of the large drum and wind it on the Storage Spool, it is necessary only to lock the Mike Switch with the Rewind Button depressed.

To Listen -

1. Press the Listen Button.

2. Adjust the Listen Volume Control (located nearest the Master and Interkom Push Buttons) to suit.

3. Step on the Foot Switch.

You may listen to the "Steno" through its own self-contained speaker, or you may connect an earphone into outlet No. 3.

The "Steno" not only stops when you remove your foot from the Foot Switch, but it also automatically back-spaces itself. This is done so that if the secretary or stenographer misses a word, or wishes to stop the machine for some reason, the last few words will be picked up before proceding with the dictation. Near the rear of the left end of the machine is a small hole through which may be seen a screwdriver slot, Figure 2. The amount of automatic back-space may be adjusted by turning this screw clockwise to increase the back-spacing.

To Listen From the Remote Control Position -

Cables for the Remote Station are available in lengths of 25' and 37-1/2'. These may be coupled together to provide any length of cable, up to 150', without impairing performance.

Connect the male plug on the cable into outlet No. 3, and the female connector on the other end - either to the male connector of an additional cord length or to

the male connector in the side of the Remote Station.

You may listen to the "Steno" through the speaker of the Remote Station, or you may plug an earphone into the plug of the Remote Station. This automatically disconnects the loudspeaker.

When listening from the Remote Station, the back-spacer works exactly the same as it does at the machine.

Interkom -

When a Remote Station is connected to the "Steno," two-way intercommunication is provided. The Interkom system is controlled at the "Steno" only. If the dictator at the "Steno" wishes to speak to the person at the Remote Control Station, the Listen Button must be depressed and the Interkom Push Button held in, using the speaker in the "Steno" as a microphone. When the Interkom Button is released, the person at the Remote Station may reply.

If the secretary is listening to dictation at the Remote Station from the "Steno," and the person at the "Steno" wishes to speak to the secretary at the Remote Station, all he has to do is to push in on the Interkom Button. This stops the recorder, automatically back-spaces, and stops again. They may now carry on this two-way communication as described above. However, if the secretary is using the earphones at the Remote Station, she must unplug the earphones from the remote Station to make a reply.

The person at the "Steno" has complete control of the direction of the conversation, at any instant he wishes, by the Interkom Button on the "Steno."

When the secretary is again given control of the "Steno" by the Master Button, the last words typed by her, before she was interrupted, will be repeated, due to the back-spacing of the machine.

Removal of Recorded Material -

Dictated material may be removed from one machine and transferred - quickly and conveniently - to another machine in the following manner. Place the index finger of the left hand behind the wire to the left of the Recording Head. Pull the wire forward approximately 2-1/2". Remove the storage spool from the Rewind Hub and move it toward the front of the machine. Now rotate the removable turntable clockwise to take up the wire between it and the spool, and lay the wire in one of the serrations of the turntable drum. Place the Storage Spool in the center of the drum. During this operation, the wire must be kept taut and free of any kinks, so that it will not become loose or tangled. The large drum and spool may now be removed from the machine as a unit and transferred to any other machine.

If a note is made of the position of the timer when the spool and large drum are removed from the machine, the timer may then be set on the machine to which the recording is transferred.

NOTE: The "Steno," in addition to being used to record - on wire - a telephone conversation, by using the Telephone Pad, may be used, also, as an amplifier by depressing both the "Talk" and "Listen" buttons. In this respect, it would be possible for a group of people to hear both sides of a telephone conversation.

SPECIAL INSTRUCTIONS

Do not touch Take-Up Drum or Rewind Hub while the "Steno" is in operation. While this in no way will injure the machine, there is the possibility of spilling or breaking the wire.

Do not remove mechanical unit or button cover while AC cord is attached.

Do not drop Microphone. While this Microphone is of rather rugged construction, it cannot stand continuous abuse.

Do not plug into any receptacle without first checking with your local electric company. This "Steno," unless otherwise noted, is intended for use with a 117 volt, 60 cycle alternating current.

Do not place Telephone Pick-Up Pad too close to "Steno" while the Telephone Pick-Up Pad is in use, as the AC hum radiation of the amplifier will be picked up by the induction coil in the Telephone Pick-Up Pad, and create a 60 cycle hum signal which may spoil the recording. The suggested method of checking to find best possible position for the reduction of hum is to press both the Talk and Listen Buttons. Turn Talk Volume control to its maximum position, and move the Telephone and the Telephone Pick-Up Pad to various points away from the "Steno" until the hum is at its lowest level. The Pick-Up Pad should be used in that relative position. The best possible position is usually four to six feet away from the amplifier.

Do not use any other three conductor Microphone Plug. The Crescent Plug was designed expressly for the "Steno" to pass the Underwriters' specifications.

Do not remove any accessories by pulling on the cords; use the plug handles. Pulling on the cords will loosen the solder connections and possibly cause a break down or a short within your "Steno."

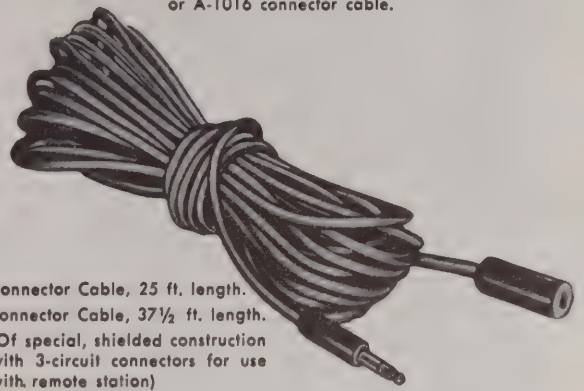
Do not place "Steno" or Microphone on top of or near a source of heat, as heat will affect the operation.

Care should be taken in the handling of the Removable Turntable as this is made of bakelite. This removable drum should be placed on the desk or the machine and not tossed, as a chip or broken portion on the outside periphery may cause your wire to become tangled or broken. It is suggested that if this happens, you replace the drum immediately.

Accessories for Steno—by Crescent

A-1019 Telex Monoset lightweight headset with plastic insulated tinsel cord, and plug.

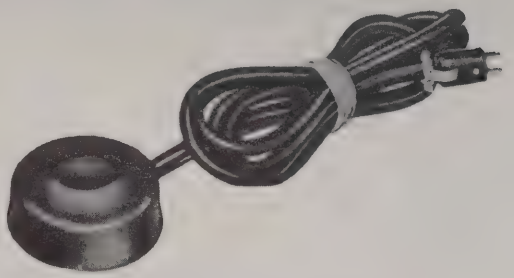
A-1014 Remote station with built-in microphone-speaker unit, outlets for earphone and switch. For use with Cat. No. A-1015 or A-1016 connector cable.



A-1015 Connector Cable, 25 ft. length.

A-1016 Connector Cable, 37½ ft. length.

(Of special, shielded construction with 3-circuit connectors for use with remote station)



A-1021 Foot Switch with 10 ft. cable and plug.

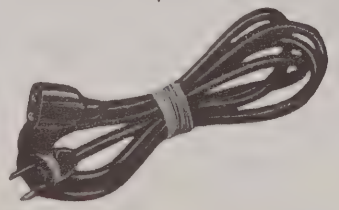
A-1017 Removable Drum with wire spool holder. Lightweight bakelite construction for convenient usage, handling and storage.

A-1001 One Hour Spool Crescent Recording Wire.

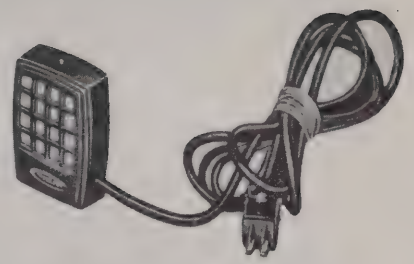
A-1002 One-Half Hour Spool Crescent Recording Wire.

A-1003 One-Quarter Hour Spool Crescent Recording Wire.

(Highest Quality Recording Wire with tape leaders for easy threading and automatic operation of shut off device)

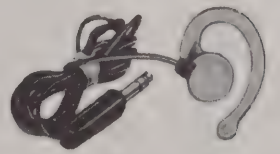


A-1023 Power Cord. 10 ft. length. Molded rubber construction for maximum utility and safety.

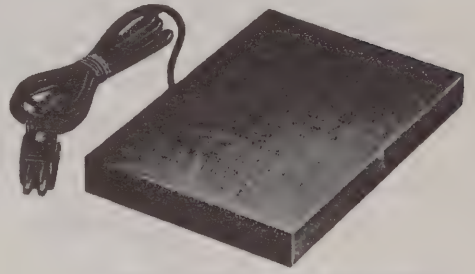


A-1022 Electro-Voice special No. 915-type microphone with push-to-talk and locking switch, cable and plug.

A-1010 Microphone base with lock washer and screw for attaching to EV No. 915 Type microphones. Combination hand or desk type unit.



A-1018 Midget Earpiece with cord and plug. Adjustable for use on either ear. Permits listening with one ear, leaving other free.



A-1020 Telephone Pickup with shielded cable and plug. Allows recording of both sides of the phone conversations without connection to telephone line.

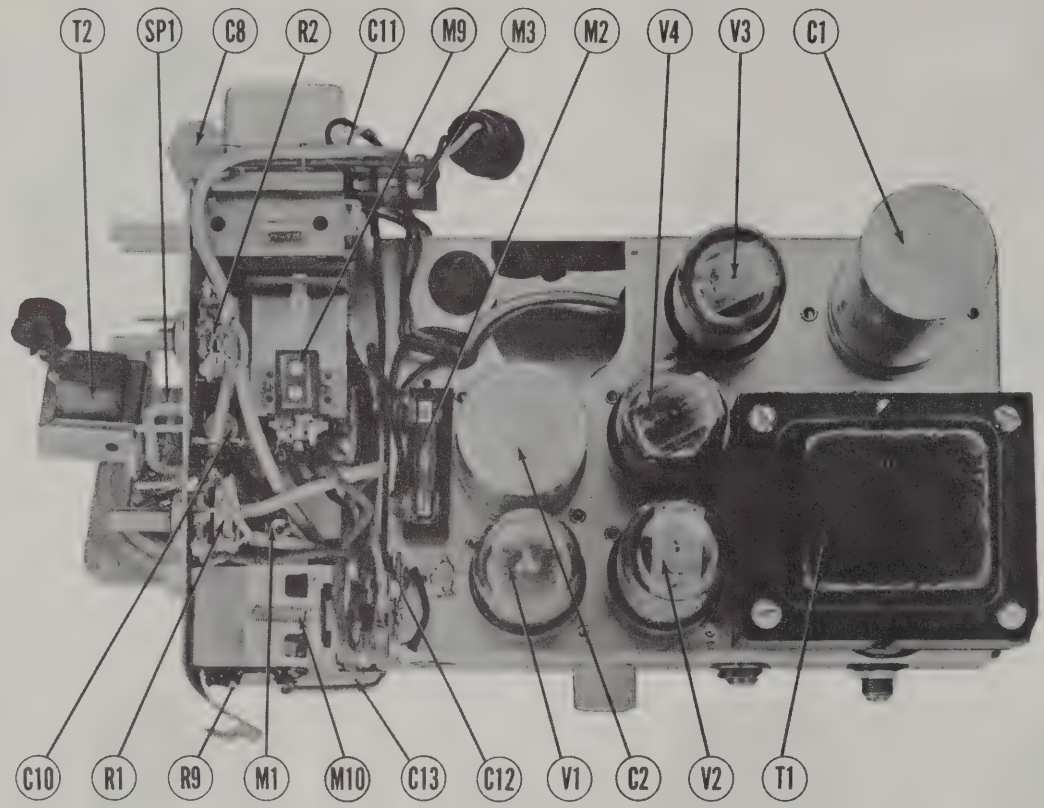


Figure 4

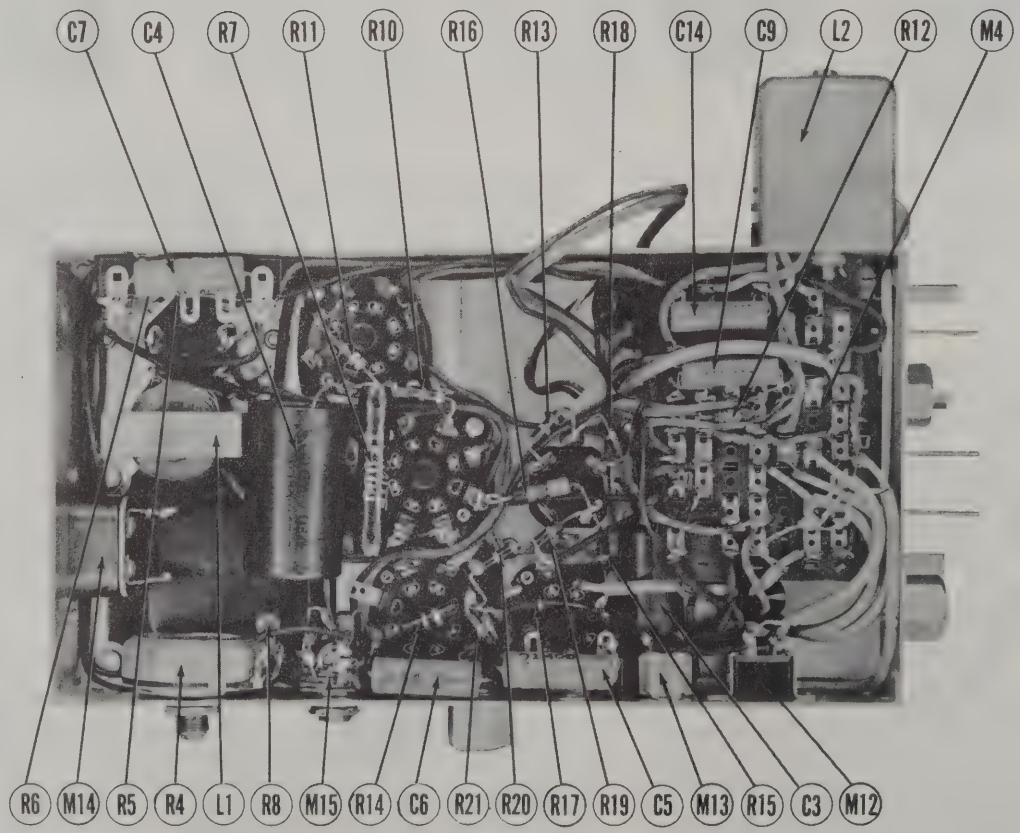
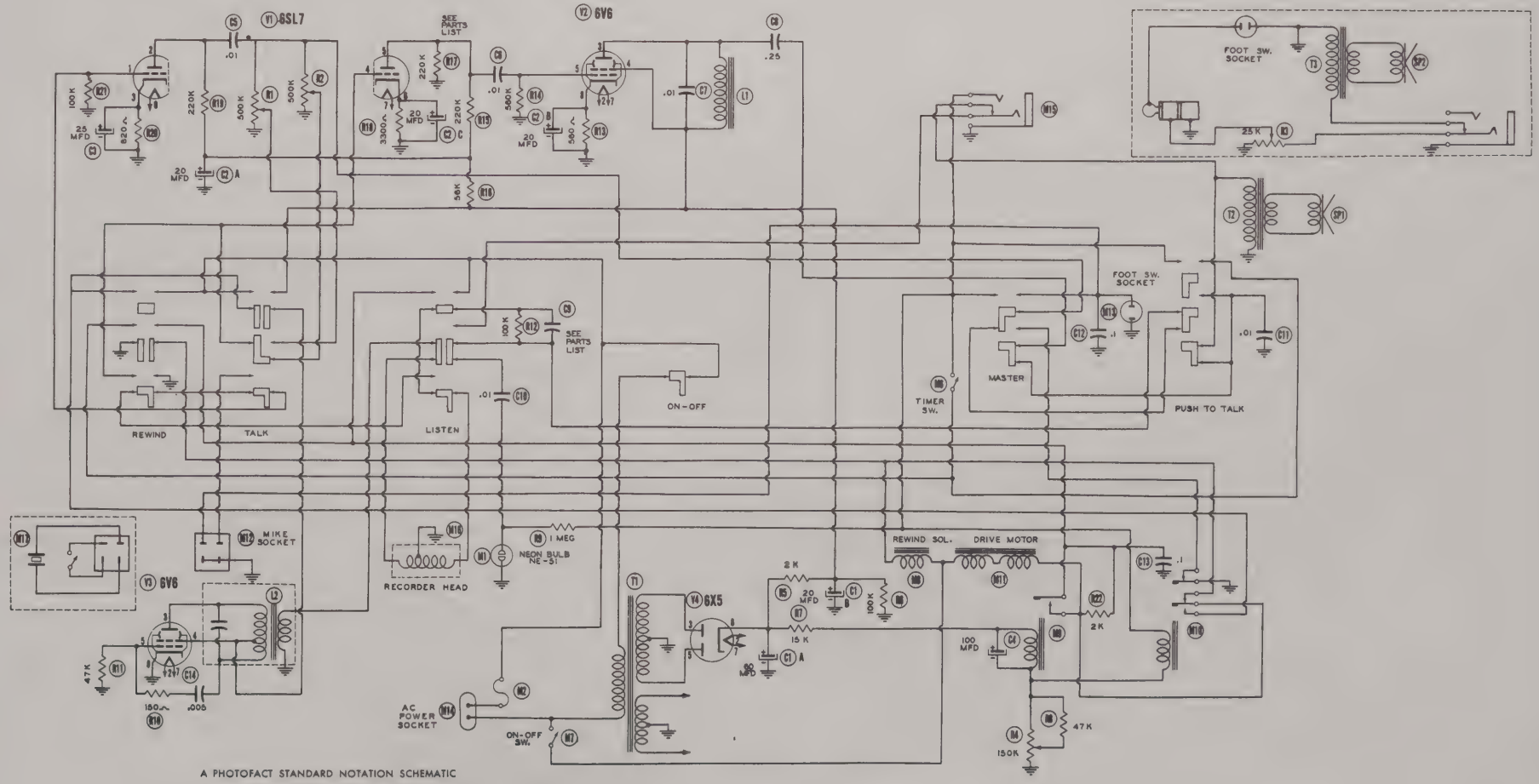


Figure 5



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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CRESCENT "STENO" PARTS LIST

Item No.	Use	Crescent Part No.	Description
V1	Audio Amplifier	10W106	6SL7GT
V2	Audio Output	10W103	6V6GT
V3	Bias-Erase Oscillator	10W103	6V6GT
V4	Rectifier	10W104	6X5GT
C1A	Filter	12W101	60 MFD. @ 350 VDC
C1B	Filter		20 MFD. @ 300 VDC
C2A	Decoupling	12W110	20 MFD. @ 300 VDC
C2B	Cathode Bypass		25 MFD. @ 25 VDC
C2C	Cathode Bypass		25 MFD. @ 25 VDC
C3	Cathode Bypass	12W102	25 MFD. @ 25 VDC
C4	Time Delay	12W111	100 MFD. @ 50 VDC
C5	Audio Coupling	12W105	.01 MFD. - 400 Volts
C6	Audio Coupling	12W105	.01 MFD. - 400 Volts
C7	Tone Compensation	12W105	.01 MFD. - 400 Volts
C8	Audio Coupling	12W113	.25 MFD. - 400 Volts
C9	Tone Compensation	12W114	.001 MFD. - 400 Volts (Used in early production.)
C10	Audio Coupling	12W105	.01 MFD. - 400 Volts
C11	Tone Compensation	12W105	.01 MFD. - 400 Volts
C12	Filter	12W106	.1 MFD. - 400 Volts
C13	Filter	12W106	.1 MFD. - 400 Volts
C14	Feedback	12W112	.005 MFD. - 400 Volts
R1	Vol. Control-Talk	11W205	500 K-Ohm - 1/2 Watt-Semi-Log Taper
R2	Vol. Control-Listen	11W205	500 K-Ohm - 1/2 Watt-Semi-Log Taper
R3	Vol. Control - External Speaker	11W206	25 K-Ohm - 1/2 Watt-Linear Taper
R4	Time Delay	11W204	150 K-Ohm - 2 Watt Linear Taper
R5	Filter	11W103-3	2000 Ohms - 10 Watt -WW
R6	Bleeder	11W104-1	100 K-Ohm - 2 Watt - Carbon
R7	Voltage Dropping	11W106-1	15K-Ohm - 5 Watt - WW
R8	Time Delay	11W105-4	47 K-Ohm - 1 Watt Carbon
R9	Voltage Dropping	11W102-5	1 Megohm - 1/2 Watt Carbon
R10	Osc. Feedback	11W102-21	150 Ohm - 1/2 Watt Carbon
R11	Osc. Grid	11W102-11	47 K-Ohm - 1/2 Watt Carbon
R12	Tone Compensation	11W102-8	100 K-Ohm - 1/2 Watt Carbon
R13	Output Cathode	11W105-5	560Ohm - 1 Watt Carbon
R14	Output Grid	11W102-7	560 K-Ohm - 1/2 Watt Carbon
R15	Audio Plate Load	11W102-13	220 K-Ohm - 1/2 Watt Carbon
R16	Decoupling	11W102-9	56 K-Ohm - 1/2 Watt Carbon
R17	Audio Plate Divider	11W102-13	22 K-Ohm - 1/2 Watt Carbon (Omitted in late production.)
R18	Audio Cathode	11W102-22	3300 Ohm - 1/2 Watt Carbon
R19	Audio Plate Load	11W102-13	220 K-Ohm - 1/2 Watt Carbon
R20	Audio Cathode	11W102-23	820 Ohm - 1/2 Watt Carbon
R21	Audio Grid	11W102-8	100 K-Ohm - 1/2 Watt Carbon
T1	Power Transformer	12W104-2	
T2	Output Transformer	Part of WR224	
T3	External Output Transformer	Part of WR236	
L1	Plate Choke	13W105	
L2	Oscillator Coil	13W101-2	
SP1	Speaker (with Transformer and Plug)	WR224	
SP2	External Speaker (with Transformer)	WR236	
M1	Level Indicator	10W105	NE-51
M2	Fuse	7W125	2 Amp. - 250 Volt
M3	2-Button Switch Assembly (Complate)	WR219	
M4	4-Button Switch Assembly (Complete)	WR218	
M5	Foot Switch	WR227	
M6	Timer Switch	TA304	
M7	On-Off Switch	WR22	
M8	Rewind Solenoid	8W37	
M9	Relay (Single Pole)	7W72	
M10	Relay (Double Pole)	7W71	
M11	Drive Motor - See Mechanical Manual	WDTD-15	
M12	Microphone Socket	9W118	
M13	Foot Switch Socket	9W117	
M14	AC Power Socket	9W122	
M15	Extension Speaker and Earphone Jack	9W116	
M16	Recording Head	WR37-2	
M17	Crystal Microphone - Steno	A1022	
	**Dynamic Microphone - Steno	A1044	
	Crystal Microphone - H22A1	A1008G	
	**Dynamic Microphone - H22A1	A1045	
	Control Knobs	3W209	
	Push Button Knobs	3W102	
	Remote Station	A1014	
	*TELEX MONOSET	A1019	
	*TELEX EARSET	A1018	
	Telephone Pickup Pad- Steno	A1020	
	Telephone Pickup Pad - H22A1	A1031	
	Power Cord - 10 ft. - Steno	A1023	
	Power Cord - 10 ft. - H22A1	A1032	
	Extension Speaker Cable - 25 ft.	A1015	
	Extension Speaker Cable - 37-1/2 ft.	A1016	
	Extension Microphone Cable - 12-1/2 ft.	A1041	
	Extension Microphone Cable - 25 ft.	A1042	
	Foot Switch with Cord and Plug	A1021	
	Crescent Recording Wire - 1/4 hour	A1003	
	Crescent Recording Wire - 1/2 hour	A1002	
	Crescent Recording Wire - 1 hour	A1001	

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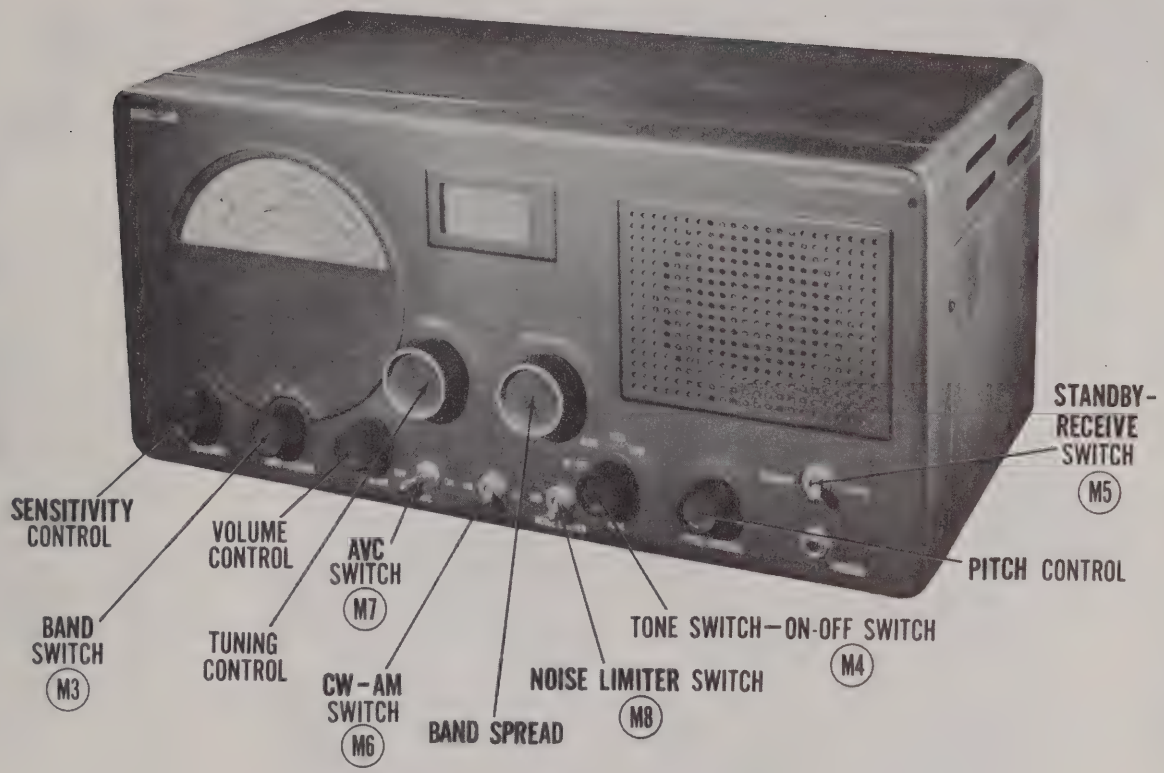
**Used in later production.

HALLICRAFTERS
MODEL S-40B



HALLICRAFTERS
MODEL S-40B

HALLICRAFTERS MODEL S-40B

TRADE NAME	Hallicrafters, Model S-40B
MANUFACTURER	The Hallicrafters Co., 5th and Kostner Aves., Chicago 24, Illinois
TYPE SET	AC Operated 4 Band Superheterodyne Communications Receiver
TUBES (EIGHT)	Types 6SG7 RF Amp., 6SA7 Converter, 6SK7 1st IF Amp., 6SK7 2nd IF Amp., 6H6 Det.-AVC-ANL, 6SC7 AF Amp.-BFD, 6K6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	105-125 Volts AC RATING .61 Amp. @ 117 Volts AC
TUNING RANGE -	(Band #1)540-1680KC, (Band #2)1680KC-5.4MC, (Band #3)5.3MC-15.5MC, (Band #4)15.5MC-44MC

HOWARD W. SAMS & CO., INC. • Indianapolis 1, Indiana

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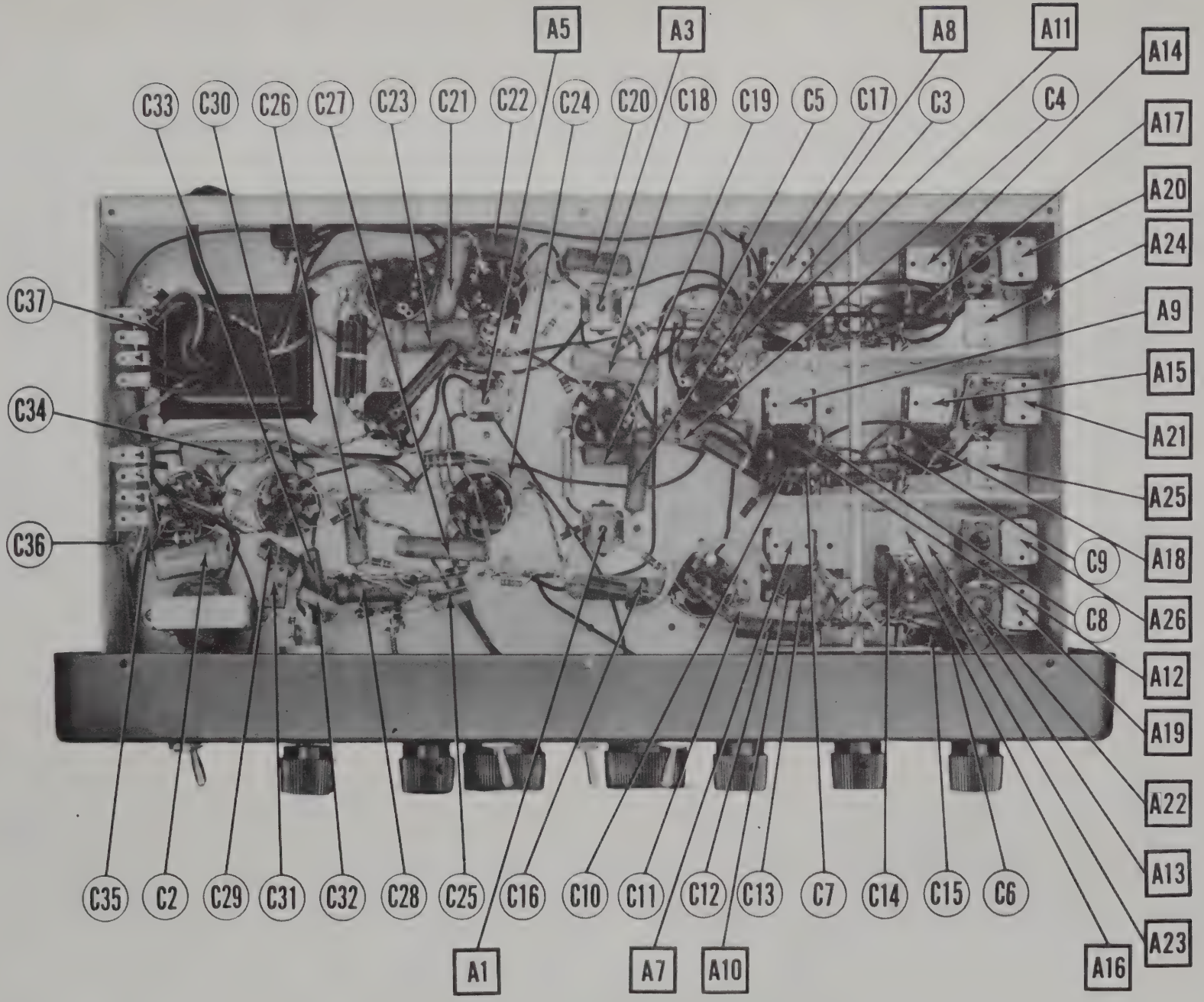
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A8
A11
A14
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C30
C26
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C5
C17
C3
C4
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A20
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C37
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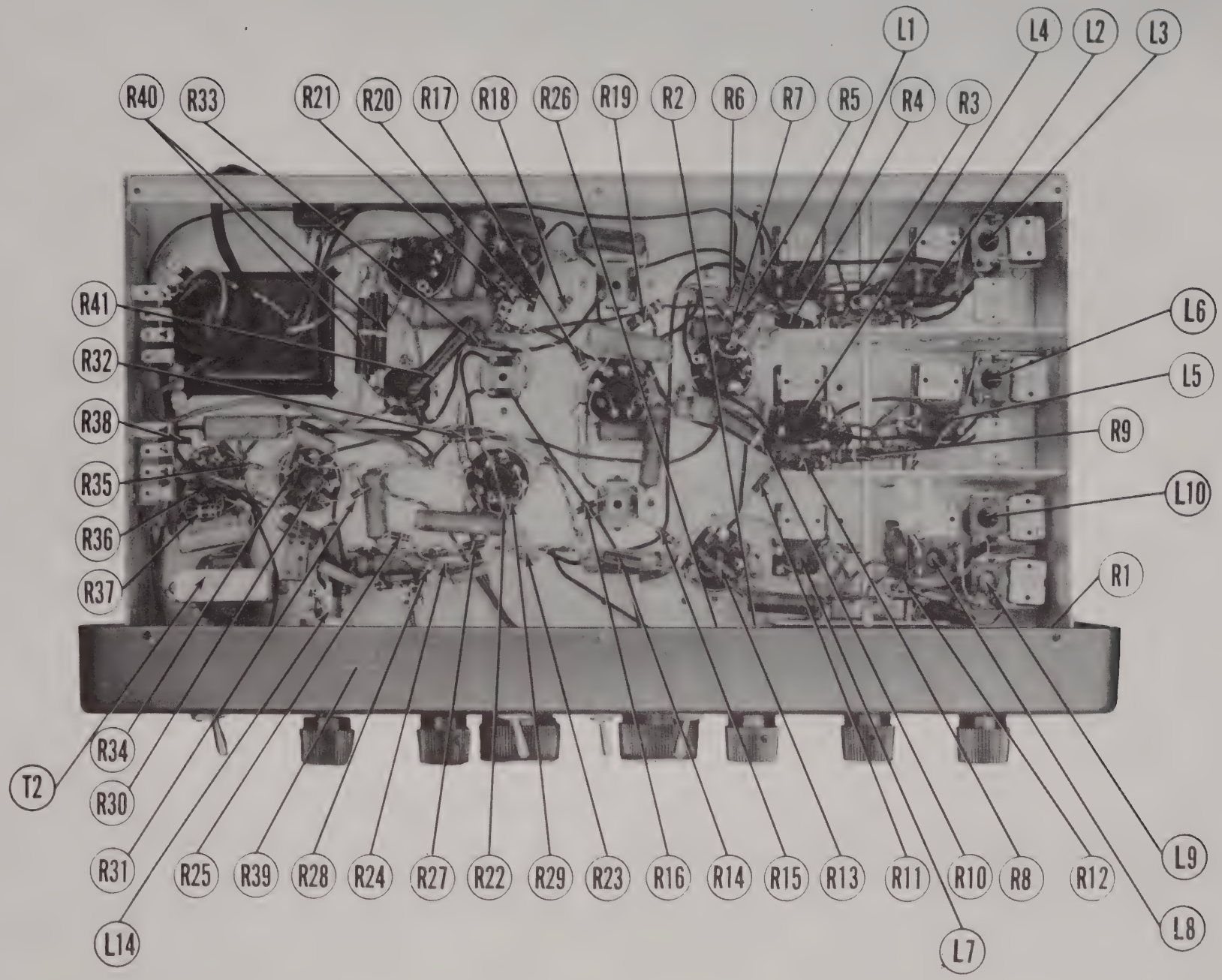
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R4
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R41
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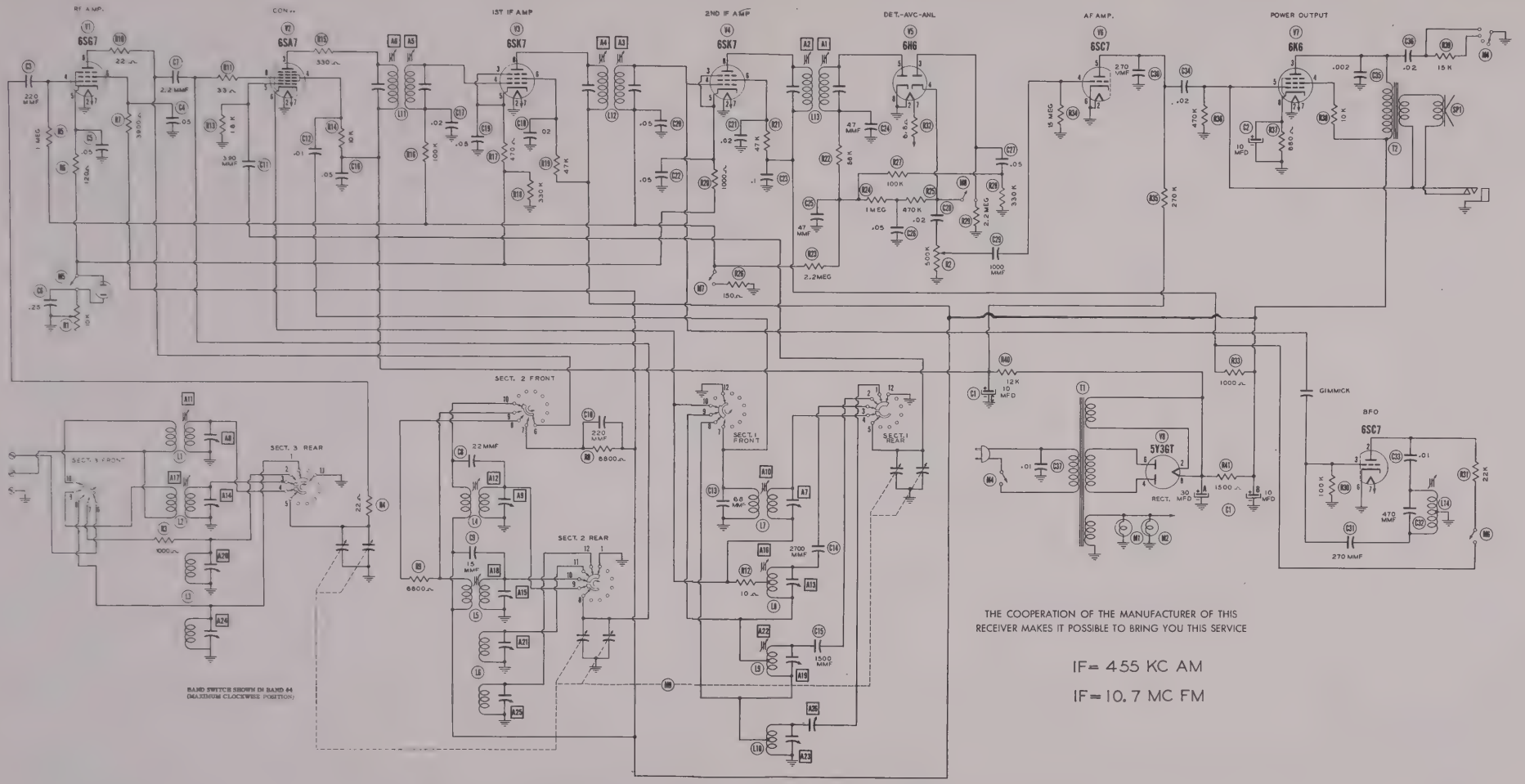

BAND SWITCH SHOWN IN BAND 44
(MAXIMUM CLOCKWISE POSITION)

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

IF = 455 KC AM

IF = 10.7 MC FM

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SG7	0V	0V	45VDC	0V	45VDC	330VDC	6.3VAC	325VDC
V 2	6SA7	0V	0V	200VDC	100VDC	8-8.8VDC	.2VDC	6.3VAC	0V
V 3	6SK7	0V	0V	47VDC	0V	47VDC	305VDC	6.3VAC	320VDC
V 4	6SK7	0V	0V	50VDC	0V	50VDC	315VDC	6.3VAC	325VDC
V 5	6H6	0V	0V	-.2VDC	0V	-.6VDC	-.6VDC	6.3VAC	0V
V 6	6SC7	0V	a260VDC	-.6VDC	-.6VDC	75VDC	0V	6.3VAC	0V
V 7	6K6GT	0V	0V	315VDC	290VDC	0V	290VDC	6.3VAC	32VDC
V 8	5Y3GT	0V	380VDC	0V	340VAC	0V	340VAC	0V	380VDC

‡ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SG7	0Ω	0Ω	9KΩ	3.6Meg	8KΩ	140KΩ	.1Ω	18.3KΩ
V 2	6SA7	0Ω	0Ω	112KΩ	122KΩ	18KΩ	0Ω	.1Ω	22Ω
V 3	6SK7	0Ω	0Ω	8.5KΩ	2.7Meg	8.5KΩ	148KΩ	.1Ω	11.5KΩ
V 4	6SK7	0Ω	0Ω	9KΩ	2.9Meg	9KΩ	150KΩ	.1Ω	12.5KΩ
V 5	6H6	0Ω	0Ω	2.2Meg	1.9Meg	490KΩ	490KΩ	.1Ω	0Ω
V 6	6SC7	0Ω	1.25KΩ	100KΩ	15Meg	128KΩ	0Ω	.1Ω	0Ω
V 7	6K6GT	0Ω	0Ω	11.9KΩ	11.5KΩ	410KΩ	112KΩ	.1Ω	680Ω
V 8	5Y3GT	Inf.	50KΩ	Inf.	1800	Inf.	1800	Inf.	50KΩ

† MEASURED FROM PIN 2 OF V 8

a TAKEN WITH CW-AM SWITCH IN CW
RECEIVE-STANDBY SWITCH IN RECEIVE
AVC SWITCH ON
NOISE LIMITER SWITCH ON
CW-AM SWITCH IN AM UNLESS OTHERWISE NOTED
BAND SWITCH IN BAND 1 (.55-1.5MC)

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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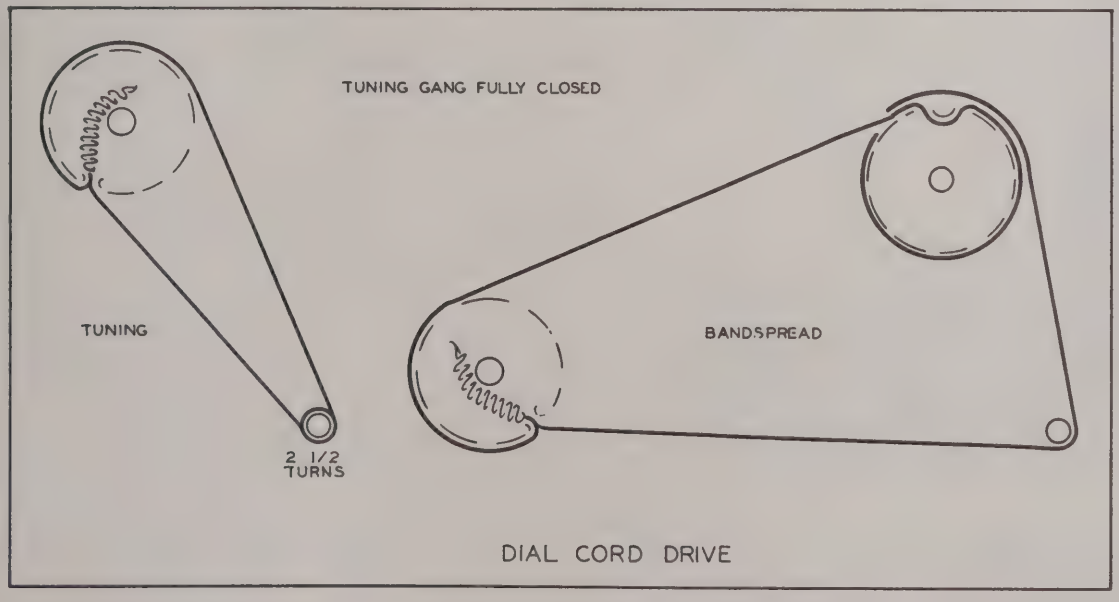
ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial scale, turn main tuning gang fully closed and set the dial scale so the zero calibration on the logging scale is aligned with the index line on the dial covering.
To set the bandspread dial scale, turn the fine tuning gang fully open and set the zero calibration on the bandspread dial scale even with the index mark on the dial covering.
The RMA dummy antenna consists of a 200MMF capacitor in series with a 20 microhenry choke, the combination is shunted by a 400MMF capacitor in series with a 400 ohm carbon resistor.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	Direct	High side to stator on center section of tuning gang. Low side to chassis.	455KC (400 ∿ Mod.)	1	1000KC	Across voice coil	A1, A2, A3, A4, A5, A6	Adjust for maximum output.
2.	Direct	"	455KC (Unmod.)	"	"	"		Turn the "CW-AM" switch to "CW". Remove the pitch control knob and turn the shaft until zero beat is heard in the speaker. Replace the knob with the indicator dot straight up.
3.	RMA	High side thru dummy to antenna terminal "A1". (Connect link between A2 and G). Low side to chassis.	36MC (400 ∿ Mod.)	4	36MC	"	A7, A8 A9	Adjust for maximum output.
4.	RMA	"	18MC	"	18MC	"	A10, A11 A12	Adjust for maximum output. Repeat steps 3 and 4 until no further improvement can be made.
5.	RMA	"	14MC (400 ∿ Mod.)	3	14MC	"	A13, A14 A15	Adjust for maximum output.
6.	RMA	"	10MC (400 ∿ Mod.)	3	10MC	"	A16, A17 A18	Adjust for maximum output. Repeat steps 5 and 6 until no further improvement can be made.
7.	RMA	"	5MC (400 ∿ Mod.)	2	5MC	"	A19, A20 A21	Adjust for maximum output.
8.	RMA	"	1.8MC (400 ∿ Mod.)	2	1.8MC	"	A22	Adjust for maximum output. Repeat steps 7 and 8 until no further improvements can be made.
9.	RMA	"	1500KC (400 ∿ Mod.)	1	1500KC	"	A23, A24 A25	Adjust for maximum output.
10.	RMA	"	600KC (400 ∿ Mod.)	1	600KC	"	A26	Adjust for maximum output. Repeat steps 9 and 10 until no further improvement can be made.



DIAL CORD DRIVE

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		Hallicrafters PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	90X6SG7	6SG7	8BK	
V2	Converter	90X6SA7	6SA7	8R	
V3	1st IF Amp.	90X6SK7	6SK7	8N	
V4	2nd IF Amp.	90X6SK7	6SK7	8N	
V5	Det.-AVC-A.N.L.	90X6H6	6H6	7Q	
V6	AF Amp.-BFO	90X6SC7	6SC7	8S	
V7	Power Output	90X6K6GT	6K6GT	7S	
V8	Rectifier	90X5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	Hallicrafters PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	30	450	45A062	AFH266J		UP4I145		TVL-4729	▲ Filter
B	10	450							■ Filter
C	10	450							▲ Filter
C2	10	25	45A121	PRS25/10		BR102A		TVA-1204	Output Cath. Bypass
C3	220	500	47X20B221K	1468-00025	D6-221	5W5T25	GP2K-220	1FM-325	RF Coupling
C4	.05	400	46AW503J	P488-05	DF-503	PTE4S5		4TM-S5	RF Amp. Screen
C5	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	RF Amp. Cathode
C6	.25	200	46AT254J	P488-25		GT2P25		2TM-P25	Cathode Bypass
C7	2.2		47A160-4		TCZ-2.2				RF Coupling
C8	22		47X21UK220M	SI22	TCN-22	5W5Q2	GP1K-22	19C7	RF Coupling
C9	15		47X21UK150M	SI15	TCN-15		GP1K-15	19C6	RF Coupling
C10	220	500	47X20B221K	1468-0002	D6-221	5W5T2	GP2K-220	19C13	RF Amp. Plate
C11	390	500	47X20B391K	1468-0004	D6-391	5W5T4	GP2K-390	1FM-34	Osc. Grid Cap
C12	.01	400	46AW103J	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Osc. Feedback
C13	68		47X25UK680K		TCN-68		N750L-68	29C15	Fixed Trimmer
C14	2700	500	47X30C302K	1464-003		1R5D3		MS-23	Fixed Padder
C15	1500	500	47X30C152J	1464-0015		1R5D15		MS-215	Fixed Padder
C16	.05	400	46AW503J	P488-05	DF-503	PTE4S5		4TM-S5	RF Bypass
C17	.02	200	46AU203J	P488-02	DF-203	PTE4S2		2TM-S2	AVC Filter
C18	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	1st IF Screen
C19	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	1st IF Cathode
C20	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	AVC Filter
C21	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	2nd IF Screen
C22	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	2nd IF Cathode
C23	.1	400	46AV104J	P488-1	DF-104	PTE4P1		4TM-P1	Decoupling
C24	47	500	47X20B470M	1468-00005	D6-470	5W5Q5	GP1K-47	1FM-45	Diode RF Filter
C25	47	500	47X20B470M	1468-00005	D6-470	5W5Q5	GP1K-47	1FM-45	Diode RF Filter
C26	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	ANL Filter
C27	.05	200	45AU503J	P288-05	DF-503	PTE4S5		2TM-S5	Audio Coupling
C28	.02	200	46AU203J	P488-02	DF-203	PTE4S2		2TM-S2	Audio Coupling
C29	1000	500	47X25B102M	1468-001	D6-102	1W5D1	GP2L-001	1FM-21	Audio Coupling
C30	270	500	47X20B271K	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	AF Amp. Plate
C31	270	500	47X20B271K	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	Osc. Grid Cap
C32	470	500	47X20B471J	1469-0005	D6-471	5R5T5	GP2K-470	MS-35	Fixed Trimmer
C33	.01	400	46AW103J	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Osc. Feedback
C34	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	Audio Coupling
C35	.002	1000	46A104	P1088-022		PTE16D2		MB-D2	Output Plate Bypass
C36	.02	600	46AY203J	P688-02	DF-203	PTE6S2		6TM-S2	Tone Comp.
C37	.01	600	46AC103J	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Line Filter

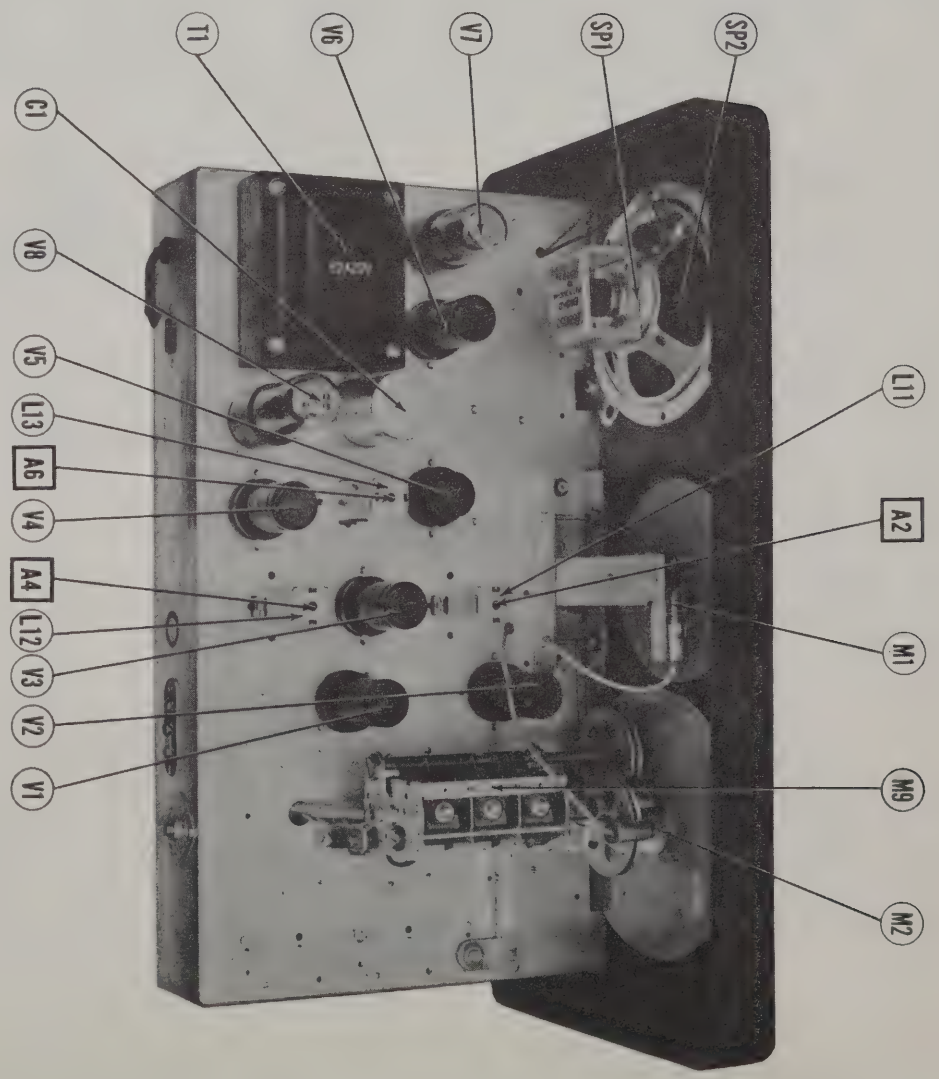
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	Hallicrafters PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	10KΩ	½	25B590	Q14-116	AM-30-V	B-15 *	Sensitivity control
B	Shaft		Not req.	Not req.	RS-2		Attach to R1A per instructions
R2A	500KΩ	½	25A534	Q13-133	AM-60-Z	B-60	Volume control
B	Shaft		Not req.	Not req.	RS-2		Attach to R2A per instructions

* Reverse right and left terminal connections.

SET 122 FOLDER 4

CHASSIS—TOP VIEW



PHOTOFACT* Folder

*TRADE MARK

MOTOROLA MODELS

19K2, B, 19K3, 19K4, B,
20F1, B

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Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL 20F1

MOTOROLA MODELS
19K2, B, 19K3, 19K4, B,
20F1, B

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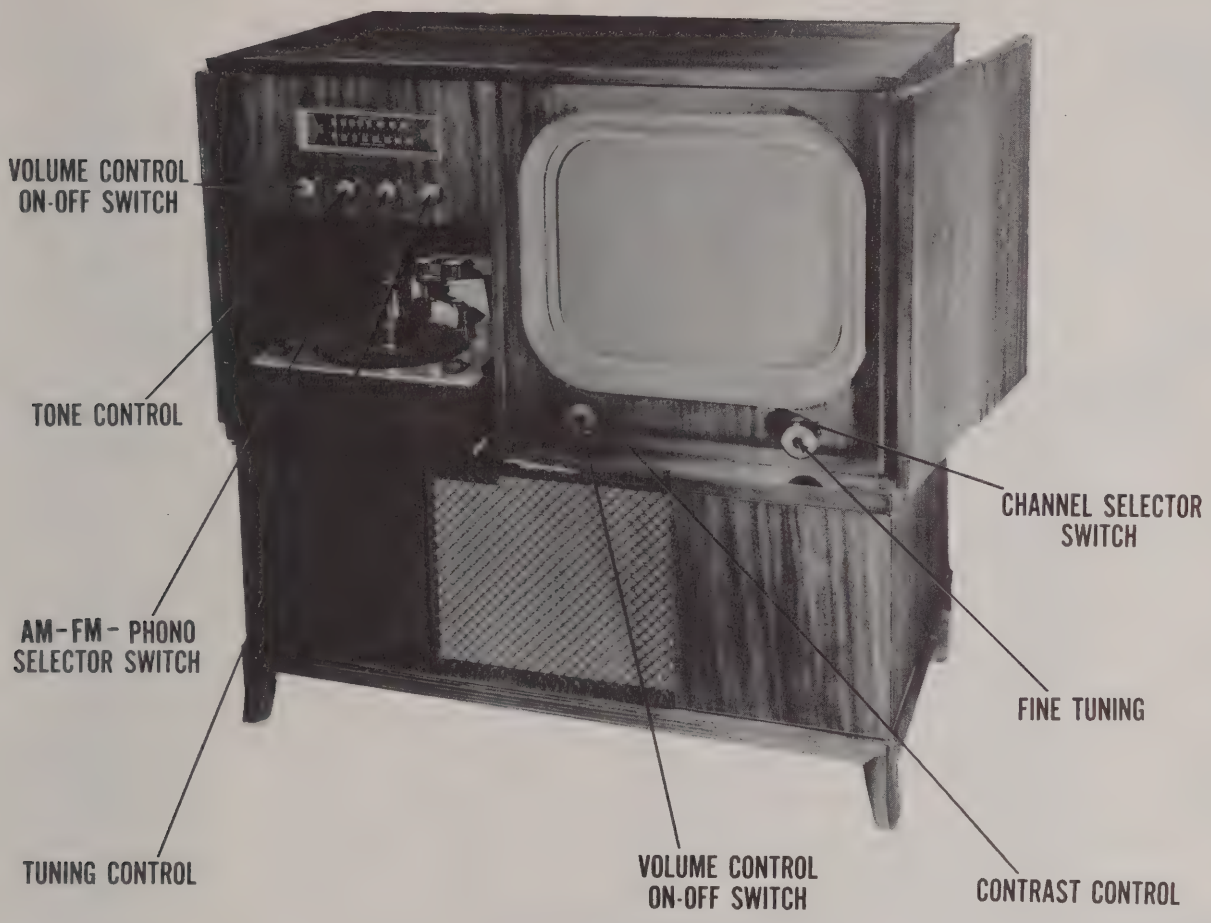
Date 1/51 Set No. 122—Folder No. 5

MOTOROLA MODELS
19K2, B, 19K3, 19K4, B, 20F1, B



MOTOROLA MODELS
19K2, B, 19K3, 19K4, B, 20F1, B

MOTOROLA MODEL 20F1

TRADE NAME	Motorola Models 19K2, B, 19K3, 19K4, B (Ch. TS-101) 20F1, B (Ch. TS-119 And Radio Ch. HS-230)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Illinois
TYPE SET	TV-AM-FM-Phono Combination Receiver (Some Models "TV Only")
TUBES	Thirty (Models 20F1, B) Twenty One (Models 19K2, B, 19K3, 19K4, B)
POWER SUPPLY	110-120 Volts AC - 60 Cycle
RATING	1.85 Amp. @ 117 Volts AC (TV)
TUNING RANGE	(TV) - Channels 2 thru 13, (FM) - 88-108MC, (AM) - 540-1620KC

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FOR SERVICE INFORMATION ON RADIO CHASSIS HS-230 - SEE PHOTOFACT SET #111 - FOLDER #9. RECORD CHANGER UNIT - MOTOROLA RC-36A

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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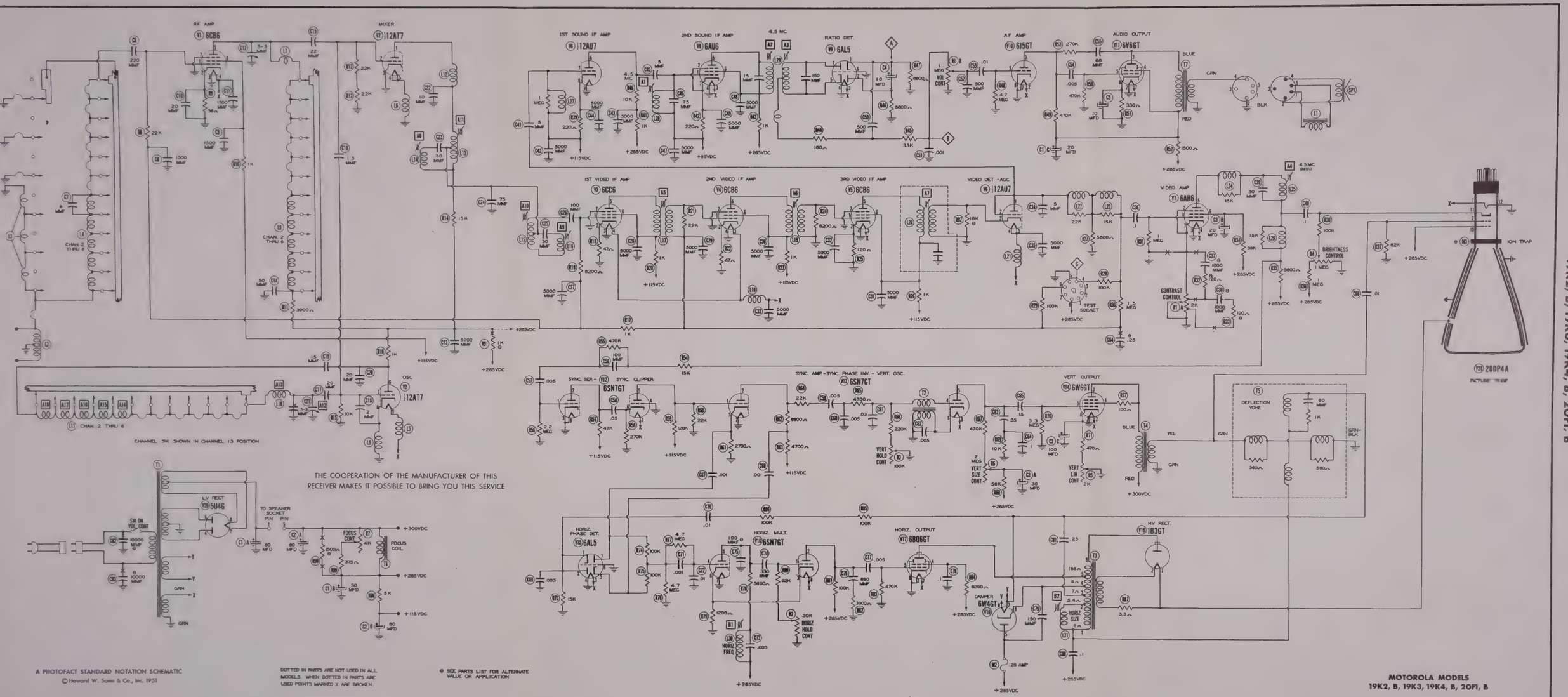

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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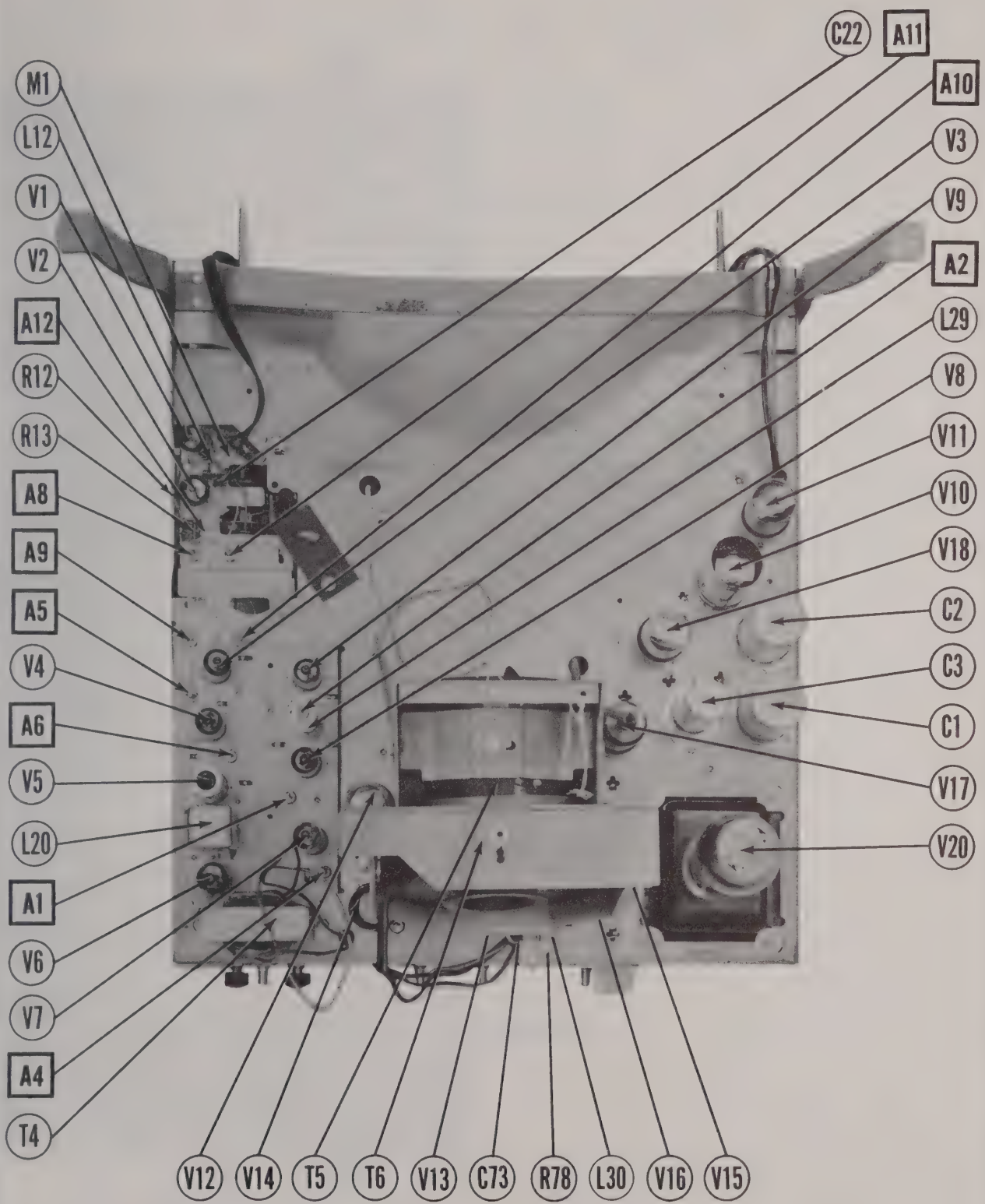
DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN.

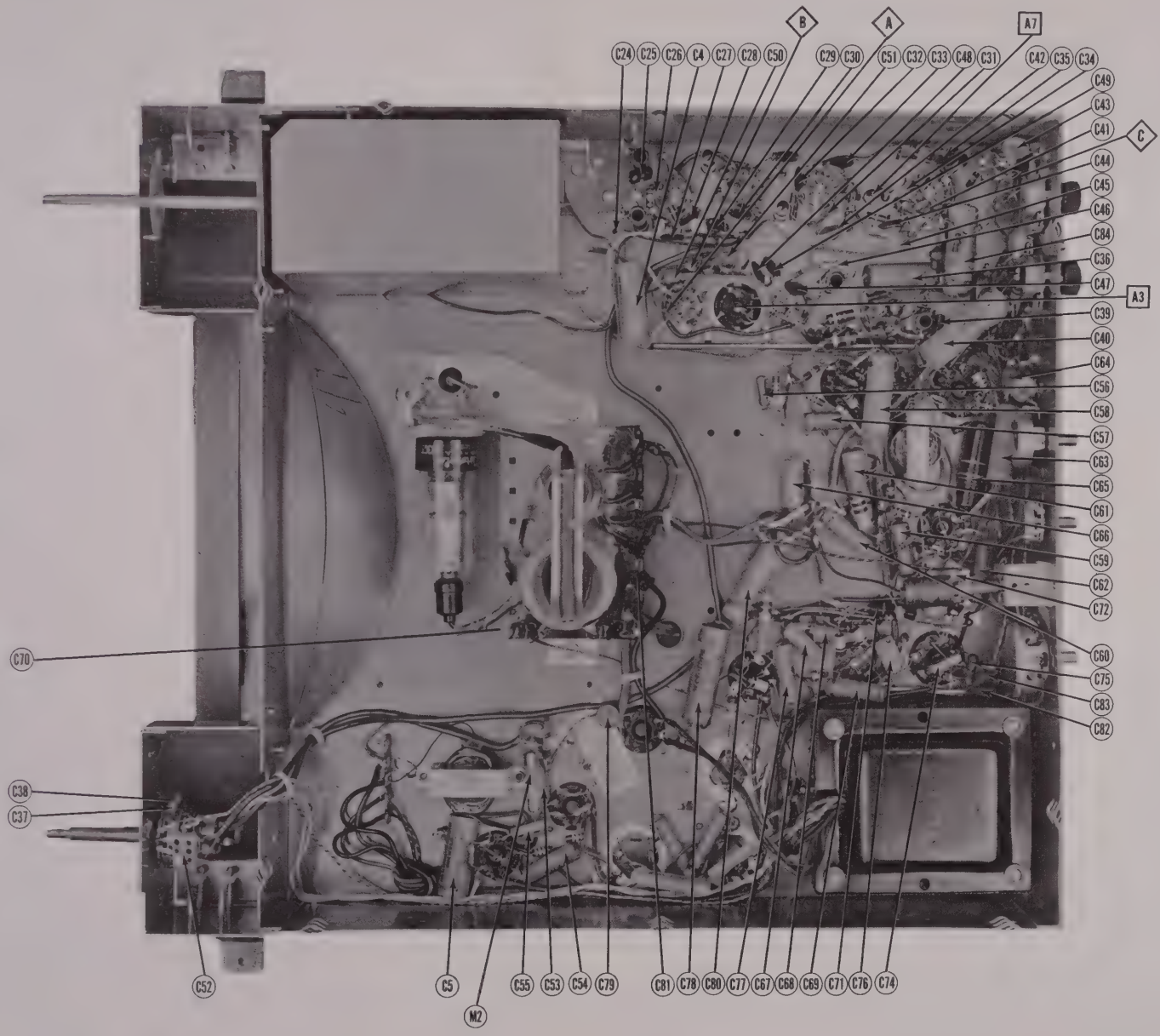
⊕ SIDE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

MOTOROLA MODELS
19K2, B, 19K3, 19K4, B, 20FI, B

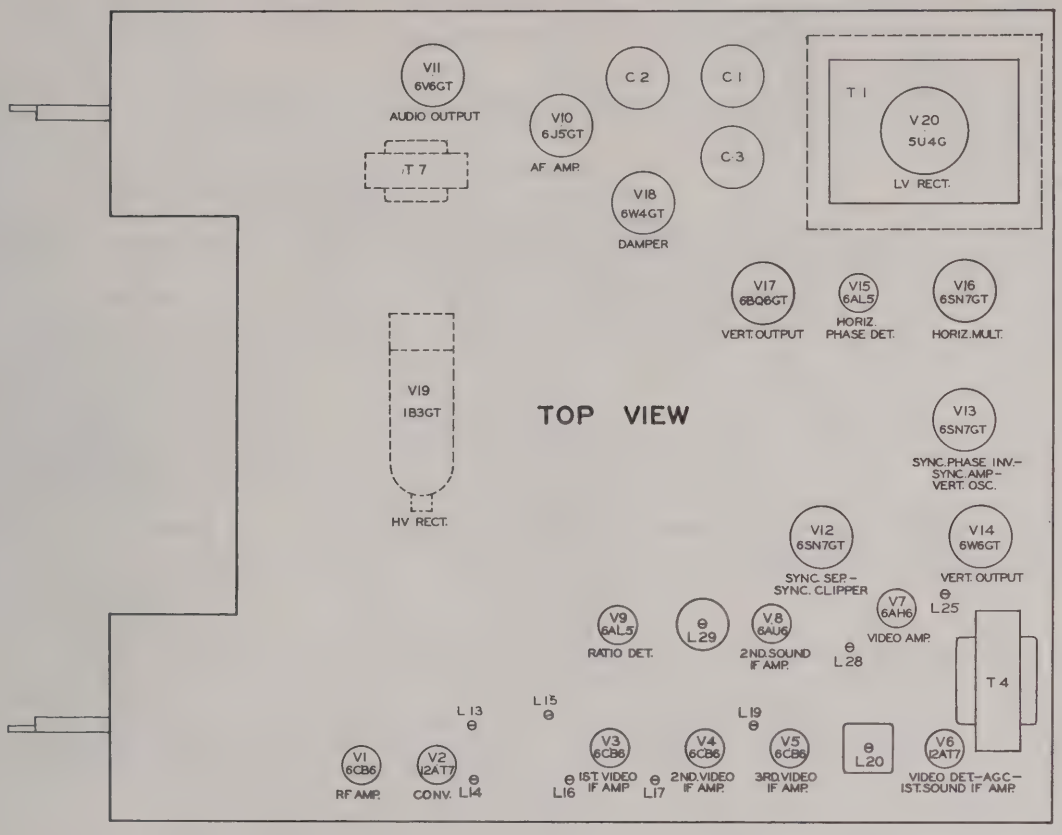
MOTOROLA MODELS
19K2, B, 19K3, 19K4, B, 20FI, B

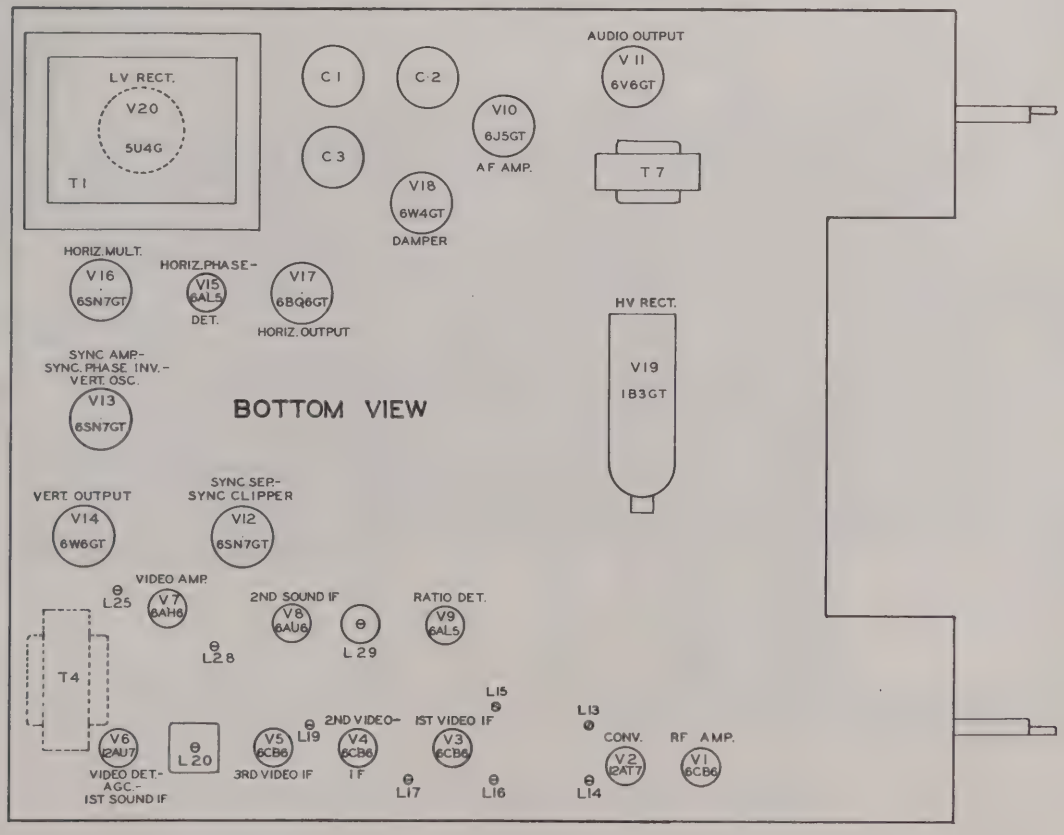


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To eliminate the high voltage shock hazard and prevent spurious signal interference, remove the horizontal output tube (V17) from its socket and connect a 2500Ω 25 watt resistor between pin 8 of the test socket and chassis.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (Grid) of 12AU7 (V6). Low side to chassis.	4.5MC (Unmod.)	Any	DC Probe to Point (A). Common to chassis.	A1, A2	Adjust for maximum deflection.
2.	.001MFD	"	"	"	DC Probe to Point (B). Common to chassis.	A3	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.
If A2 shows two points of resonance, use the one with the screw farthest out.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 7 (Grid) of 12AU7 (V6). Low side to chassis.	4.5MC (450KC SWP)	4.5MC	Any	Vert. Amp. to Point (A). Low side to chassis.	A1, A2	Disconnect stabilizer capacitor C4. Adjust for maximum amplitude and symmetry as per figure 1.
2.	.001MFD	"	"	"	"	Vert. Amp. to Point (B). Low side to chassis.	A3	Reconnect capacitor C4. Adjust A3 so 4.5MC occurs at center of crossover lines as per figure 2. SLIGHTLY retouch A2 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ADJUSTMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	.001MFD	High side to pin 1 (Grid) of 6AH6 (V7). Low side to chassis.	4.5MC	Any	DC Probe thru detector (fig. 6) to pin 11 of picture tube. Common to chassis.	A4	Adjust for minimum deflection.

VIDEO IF ALIGNMENT

Unsolder the 1000Ω resistor connected to pin 6 of V2, this will disable the local oscillator and prevent erroneous indications.
Turn the contrast control to minimum.
Connect the negative lead of a 3 volt battery to the junction of R30 and C84, connect the positive lead to chassis.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.001MFD	High side to pin 1 (Grid) of 6CB6 (V3). Low side to chassis.	24MC (12MC SWP)	26.4MC	Any	Vert. Amp. to Point (C). Low side to chassis.	A5	Adjust to place 26.4MC marker as shown in figure 3.
5.	.001MFD	"	"	22.9MC	"	"	A6	Adjust to place 22.9MC marker as shown in figure 3.
6.	.001MFD	"	"	22.9MC 26.4MC	"	"	A7	Adjust for flat topped symmetrical response as per figure 3.
7.	.001MFD	High side to pin 2 (Grid) of 12AT7 (V2). Low side to chassis.	"	21.9MC	"	"	A8	Adjust for MINIMUM marker indication at the 21.9MC point on response curve.
8.	.001MFD	"	"	20.4MC	"	"	A9	Adjust for MINIMUM marker indication at the 20.4MC point on response curve.
9.	.001MFD	"	"	22.9MC 26.4MC	"	"	A10, A11	Adjust A10 and A-11 simultaneously to place markers as shown in figure 4. The 26.4MC marker must be at 50%. A slight variation of the 22.9MC marker is permissable.

OSCILLATOR ALIGNMENT

Resolder the 1000Ω resistor connected to pin 6 of V2.
To compensate for removal of the bottom shield, turn the fine tuning control 15° to the low capacity side of mid-position.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Direct	High side to either antenna terminal. Low side to chassis.	195MC (12MC SWP)	193.25MC 197.75MC	10	Vert. Amp. to Point (C). Low side to chassis.	A12	Adjust to place sound marker in "notch" as shown in figure 5.
11.	Direct	"	213MC (12MC SWP)	211.25MC 215.75MC	13	"	A13	Adjust to place sound marker in "notch" as shown in figure 5. Repeat steps 10 and 11 until no further improvement can be made.
12.	Direct	"	85MC (12MC SWP)	83.25MC 87.75MC	6	"	A14	Expand or compress coil turns to place sound marker in "notch" as shown in figure 5.
			79MC (12MC SWP)	77.25MC 81.75MC	5		A15	
			69MC (12MC SWP)	67.25MC 71.75MC	4		A16	
			63MC (12MC SWP)	61.25MC 65.75MC	3		A17	
			57MC (12MC SWP)	55.25MC 59.75MC	2		A18	

THE ANTENNA AND RF PORTION OF THIS RECEIVER HAS BEEN PROPERLY ALIGNED AT THE FACTORY AND IS VERY STABLE. ADJUSTMENT OF THIS PORTION SHOULD NOT BE REQUIRED IN THE FIELD.

ALIGNMENT INSTRUCTIONS (CONT.)

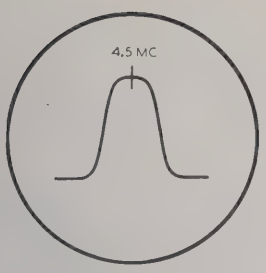


FIG. 1

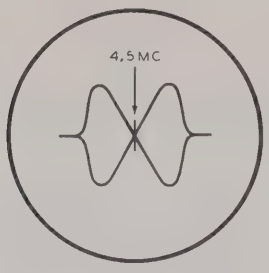


FIG. 2

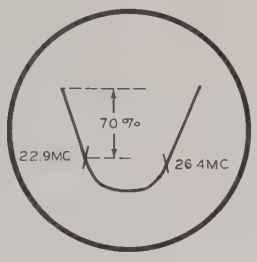


FIG. 3

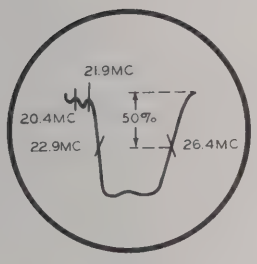


FIG. 4

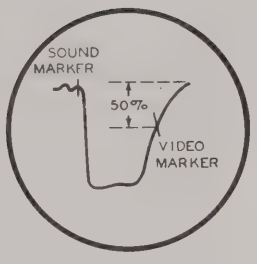


FIG. 5

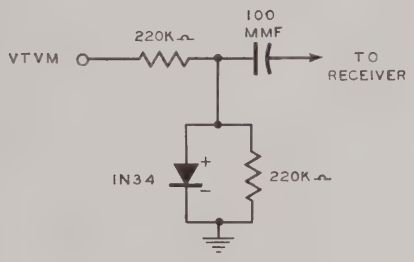
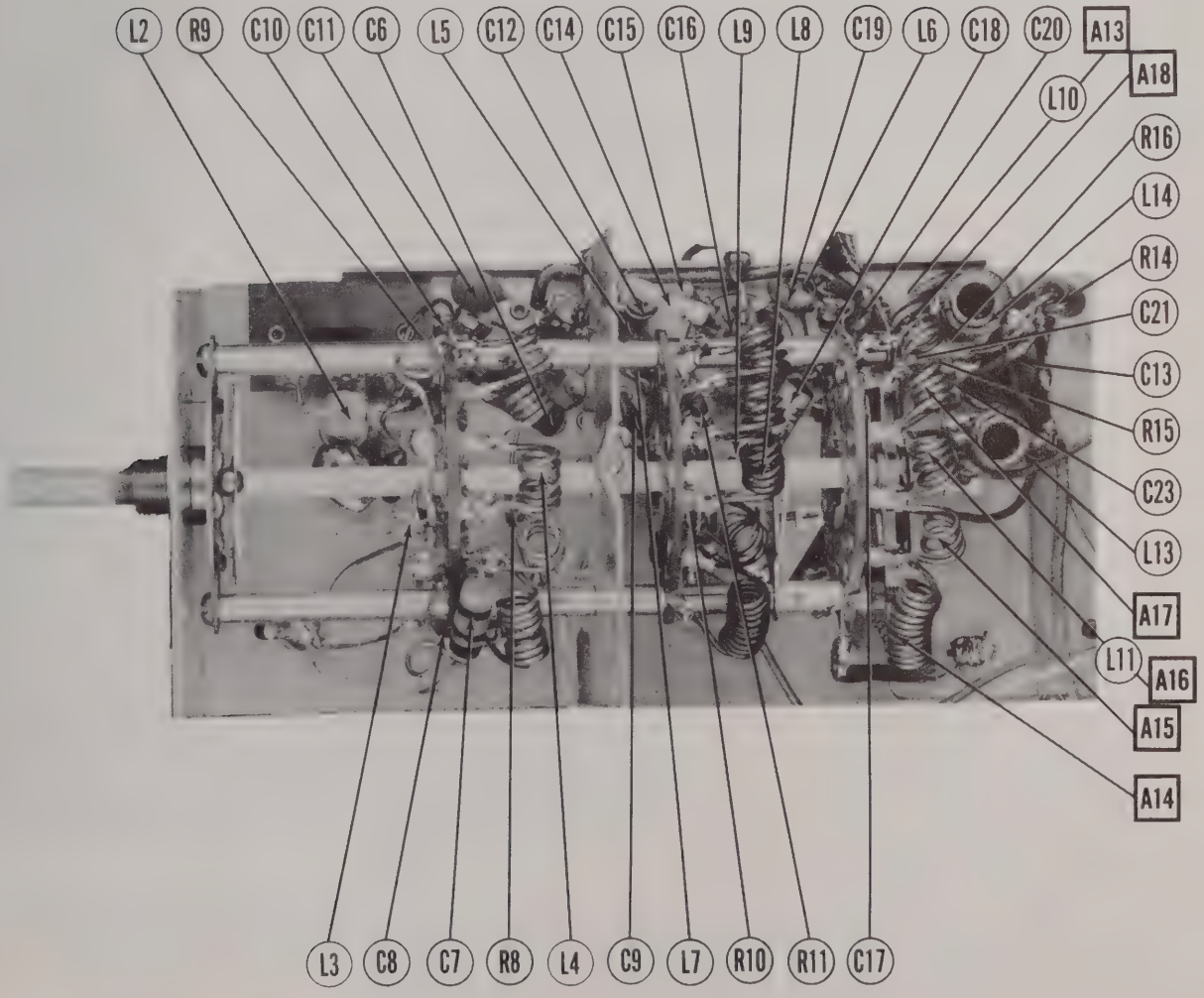


FIG. 6



RF TUNER

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	-3.2VDC	.5VDC	0V	6.3VAC	225VDC	105VDC	0V		
V 2	12AT7	165VDC	-2.6VDC	0V	0V	0V	225VDC	§-2.8VDC	0V	6.3VAC
V 3	6CB6	-1VDC	.6VDC	0V	6.3VAC	100VDC	100VDC	0V		
V 4	6CB6	-.5VDC	.6VDC	6.3VAC	0V	100VDC	100VDC	0V		
V 5	6CB6	0V	1.4VDC	6.3VAC	0V	100VDC	100VDC	0V		
V 6	12AU7	-1.1VDC	-1.1VDC	0V	6.3VAC	6.3VAC	#80VDC	#0V	#1.4VDC	0V
V 7	6AH6	1VDC	32VDC	0V	6.3VAC	175VDC	145VDC	32VDC		
V 8	6AU6	#0V	#2VDC	6.3VAC	0V	#135VDC	#135VDC	#2VDC		
V 9	6AL5	.5VDC	-.5VDC	6.3VAC	0V	-.2VDC	0V	.2VDC		
V 10	6J5GT	0V	6.3VAC	25VDC	20VDC	-.8VDC	265VDC	0V	0V	
V 11	6V6GT	0V	0V	195VDC	200VDC	0V	0V	6.3VAC	13VDC	
V 12	6SN7GT	-3.2VDC	40VDC	0V	0V	13VDC	3.3VDC	6.3VAC	0V	
V 13	6SN7GT	15VDC	60VDC	15VDC	-13VDC -17VDC	110VDC 30VDC	0V	0V	6.3VAC	
V 14	6W6GT	0V	6.3VAC	290VDC	287VDC	0V	0V	0V	40VDC 27VDC	
V 15	6AL5	0V	0V	6.3VAC	0V	3.6VAC	0V	-3VDC		
V 16	6SN7GT	-5VDC -7VDC	135VDC	9.6VDC	0V	230VDC	9.6VDC	0V	6.3VAC	
V 17	6BQ6GT	0V	0V	265VDC	160VDC	-30VDC	135VDC	6.3VAC	0V	TOP CAP *
V 18	6W4GT	0V	0V	650VDC	0V	265VDC	0V	650VDC	650VDC	
V 19	1B3GT	* DO NOT MEASURE								
V 20	5U4G	0V	305VDC	0V	320VAC	0V	320VAC	0V	305VDC	
V 21	20DP4A	6.3VAC	0V	PIN 10 265VDC	PIN 110VDC	11 0V	PIN 12 0V			

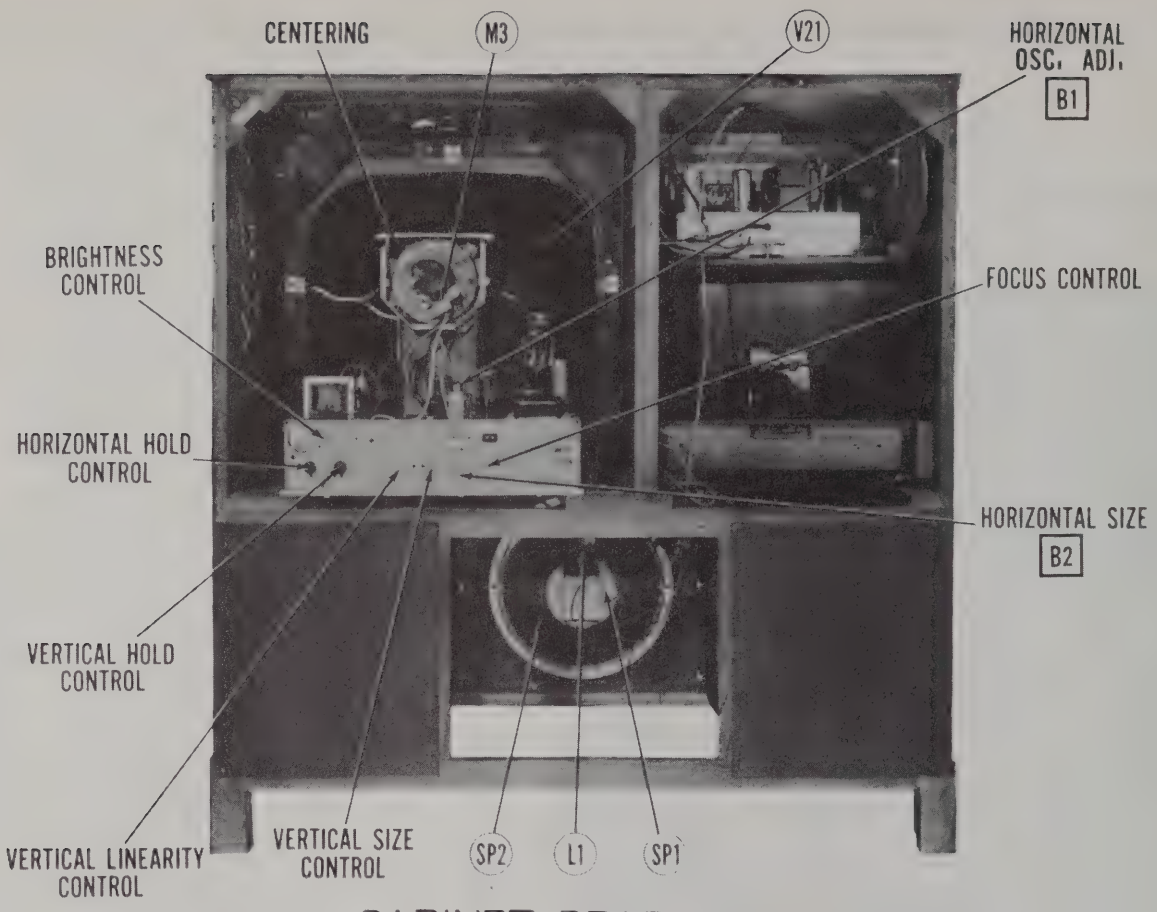
FOCUS CONTROL COUNTER CLOCKWISE
§ TAKEN WITH VACUUM TUBE VOLTMETER
# MEASURED FROM †115VDC POINT
* DO NOT MEASURE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	1.5Meg	56Ω	0Ω	.1Ω	†5KΩ	†6.1KΩ	0Ω		
V 2	12AT7	†16KΩ	44KΩ	0Ω	0Ω	0Ω	†2.2KΩ	10KΩ	2Ω	.4Ω
V 3	6CB6	1.5Meg	47Ω	0Ω	.1Ω	#1KΩ	#1KΩ	0Ω		
V 4	6CB6	1.5Meg	47Ω	.1Ω	0Ω	#1KΩ	#1KΩ	0Ω		
V 5	6CB6	.7Ω	120Ω	.1Ω	0Ω	#1KΩ	#1KΩ	0Ω		
V 6	12AU7	5.6KΩ	5.6KΩ	.7Ω	.1Ω	.1Ω	†1KΩ	#6Ω	#220Ω	0Ω
V 7	6AH6	1Meg	2KΩ	0Ω	.1Ω	†5.7KΩ	†39KΩ	2KΩ		
V 8	6AU6	#1.2Ω	#220Ω	.1Ω	0Ω	†1.1KΩ	†1.1KΩ	#220Ω		
V 9	6AL5	6.8KΩ	6.8KΩ	.1Ω	0Ω	1Meg	0Ω	1Meg		
V 10	6J5GT	0Ω	.1Ω	†470KΩ	740KΩ	4.7Meg	†140Ω	0Ω	0Ω	
V 11	6V6GT	Inf.	0Ω	†1.9KΩ	†1.6KΩ	470KΩ	Inf.	.1Ω	330Ω	
V 12	6SN7GT	2.2Meg	†52KΩ	0Ω	0Ω	†90KΩ	270KΩ	.1Ω	0Ω	
V 13	6SN7GT	†90KΩ	†17KΩ	2.7KΩ	220KΩ 320KΩ	†520KΩ †2.5Meg	52Ω	0Ω	.1Ω	
V 14	6W6GT	82KΩ	.1Ω	†580Ω	†680Ω	3.3Meg	Inf.	0Ω	2.5KΩ 470Ω	
V 15	6AL5	15KΩ	15KΩ	.1Ω	0Ω	4.8Meg	0Ω	4.8Meg		
V 16	6SN7GT	82KΩ 105KΩ	†100KΩ	1.2KΩ	9.4Meg	†5.8KΩ	1.2KΩ	0Ω	.1Ω	
V 17	6BQ6GT	Inf.	0Ω	†140Ω	†8.3KΩ	470KΩ	†100KΩ	.1Ω	0Ω	TOP CAP ▲ 8Ω
V 18	6W4GT	Inf.	Inf.	Inf.	Inf.	†140Ω	Inf.	▲ 25Ω	▲ 25Ω	
V 19	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ▲ 190Ω
V 20	5U4G	Inf.	80KΩ	Inf.	30Ω	Inf.	30Ω	Inf.	80KΩ	
V 21	20DP4A	.1Ω	82KΩ	PIN 10 †140Ω	PIN 100KΩ	11 500KΩ	PIN 12 0Ω			

FOCUS CONTROL COUNTER CLOCKWISE
MEASURED FROM †115VDC POINT
† MEASURED FROM †300VDC POINT
▲ MEASURED FROM PIN 3 OF V18

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal hold control to the mid-position of its range.

Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal size slug (B2) until the picture fills the mask horizontally.

DISASSEMBLY INSTRUCTIONS (MODEL 20F1)

TV CHASSIS REMOVAL

1. Remove four push-on type control knobs from front of cabinet.
2. Remove eight 1/4" hex head screws holding rear cover in place. Remove rear cover.
3. Disconnect built-in antenna.
4. Disconnect speaker leads.
5. Remove six 5/16" hex head screws from bottom of chassis. Remove chassis.
6. Remove four 5/16" hex nuts holding speaker. Remove speaker.

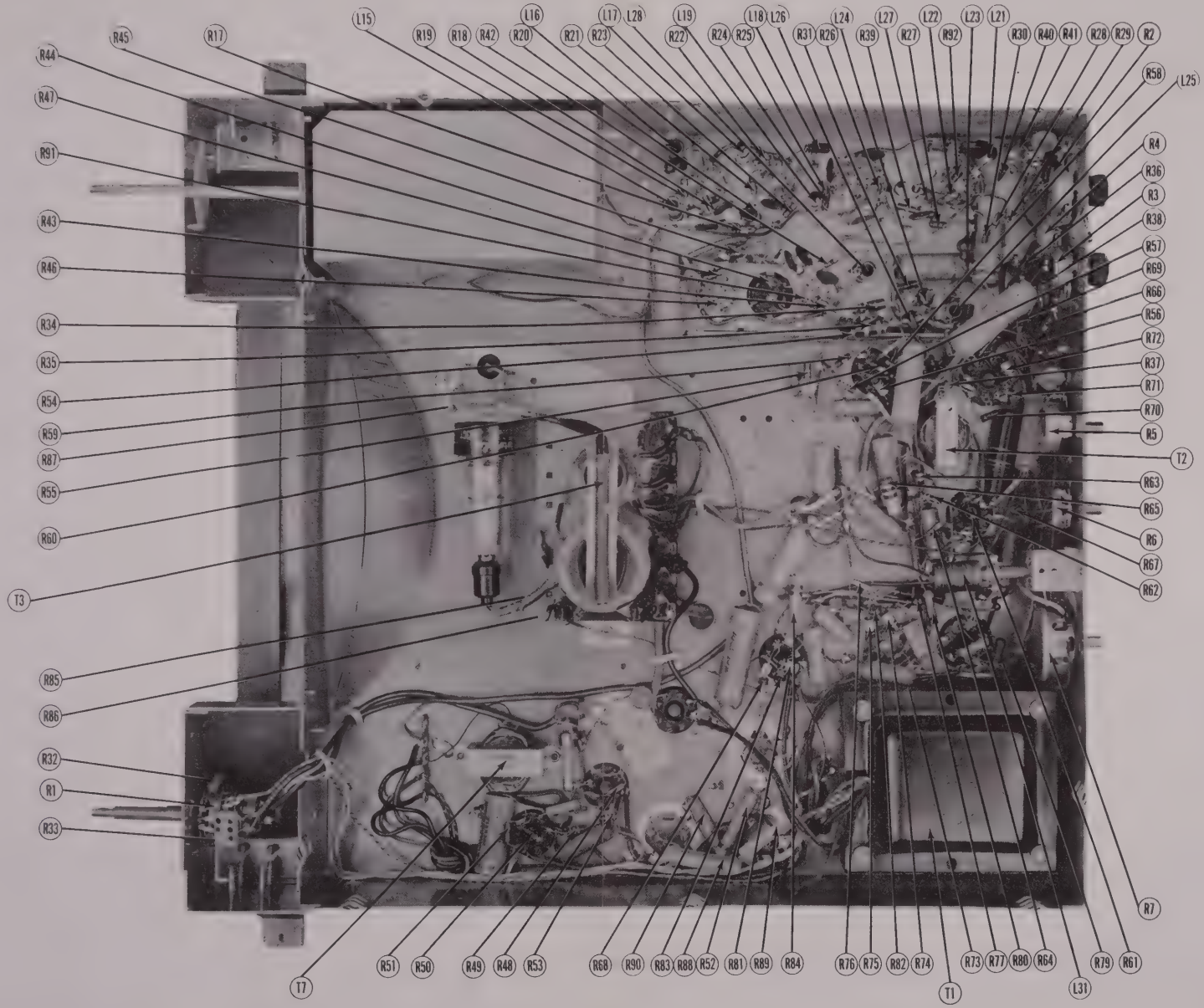
RADIO REMOVAL

1. Remove four push-on type control knobs.
2. Remove nine 1/4" hex head screws holding rear cover in place.
3. Disconnect antenna leads.
4. Disconnect phonograph power leads.
5. Remove three 1/4" hex head screws from bottom of chassis. Remove chassis.

PHONOGRAPH UNIT REMOVAL

1. Remove two 1/4' bolts from top of phonograph.
2. Remove all power leads.
3. Remove phonograph.

NOTE: FOR PICTURE TUBE REMOVAL, IT IS NECESSARY TO REMOVE THE TV CHASSIS AS OUTLINED ABOVE.



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6CB6	6CB6	6CK	
V2	Converter	12AT7	12AT7	9A	
V3	1st Video IF Amp.	6CB6	6CB6	6CK	
V4	2nd Video IF Amp.	6CB6	6CB6	6CK	
V5	3rd Video IF Amp.	6CB6	6CB6	6CK	
V6	Video Det. -AGC 1st Sound IF Amp.	12AU7	12AU7	9A	
V7	Video Amp.	6AB6	6AB6	7BK	
V8	2nd Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Det.	6AL5	6AL5	6BT	
V10	AF Amp.	6J5GT	6J5GT	6Q	
V11	Audio Output	6V6GT	6V6GT	7AC	
V12	Sync. Sep. -Sync Clipper	6SN7GT	6SN7GT	8BD	
V13	Sync. Amp. -Sync. Phase Inv. -Vert. Osc.	6SN7GT	6SN7GT	8BD	
V14	Vert. Output	6W6GT	6W6GT	8AM	
V15	Horiz. Phase Det.	6AL5	6AL5	6BT	
V16	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V17	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	3C	
V20	LV Rectifier	5U4G	5U4G	5T	
V21	Picture Tube	20DP4A	20DP4A	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	60	400	23B701013	AFH12614H		UPT62345		TVL-3790	▲ Filter
B	30	400						TVA-1604	■ Filter
C	20	350							▲ Decoupling
C2A	60	400	23B700884	AF1110G16F		UPT84245		TVL-4680	▲ Filter
B	80	350							▲ Filter
C3A	30	350	23B700885	E3C286		UP3335		TVL-2627	■ Vert. Osc. Dec.
B	20	250				BRH501		TVA-1310	▲ V. Amp. Screen
C	100	50							Vert. Cath. Bypass
C4	10	50	23A90205	PRS50/10		BR105		TVA-1304	Stabilizing Cap
C5	10	50	23A90205	PRS50/10		BR105		TVA-1304	Output Cath. Bypass
C6	220		21K77375	SI220	D6-221		GP2K-220	19C13	RF Coupling
C7	8		21K478234						Fixed Trimmer
C8	1500		21A701029	BPD-0015	DD-152		801-0015	29C8	AGC Filter
C9	1500		21A701029	BPD-0015	DD-152		801-0015	29C8	RF Amp. Screen
C10	20		21K490790	SI20	D6-200		GP1K-20	19C23	RF Amp. Cathode
C11	1500		21A701029	BPD-0015	DD-152		801-0015	29C8	RF Amp. Fil.
C12	.5-3		1X701663		S29-3				Variable Trimmer
C13	5000		21A470789	BPD-005	DD-502		811-005	29C1	RF Bypass
C14	50		21K475671	SI50	D6-500		GP1K-50	19C28	RF Amp. Plate Dec.
C15	22		21A400296	ST22	D6-220		GP1K-22	19C23	RF Coupling
C16	1.5		21K77267	SL1.5NPO	TCZ-1.5		NPOK-1.5		Osc. Coupling
C17	20		21K490790	SI20N750	TCN-20		N750K-20	19C7	Osc. Grid Cap
C18	3		21K478280						Osc. Feedback
C19	15		21K790541		TCZ-15		NPOK-15	19C5	Osc. Feedback
C20	20		21K490790	SI20N750	TCN-20		N750K-20	19C7	Osc. Plate
C21	.5-3		1X701663		S29-3				Variable Trimmer
C22	10		21K38223	SI10NPO	TCZ-10		NPOK-10	19C3	Fixed Trimmer
C23	30	500	21K470329		TCZ-30		NPOL-30	MS-43	Fixed Trimmer
C24	75		21R490581	SI75N750	TCN-75		N750L-75		Fixed Trimmer
C25	30	500	21K470329		TCZ-30	5R5Q3	NPOL-30	MS-43	Fixed Trimmer
C26	100		21K474069	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C27	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	AGC Filter
C28	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	1st V. IF Dec.
C29	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	AGC Filter
C30	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	2nd V. IF Dec.
C31	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	3rd V. IF Dec.
C32	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	3rd V. IF Cath.
C33	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	3rd V. IF Fil.
C34	5		21K70720	SI5	TCZ-4.7	5W5V5	GP1K-5	MS-55	V. Det. - S. IF Fil.
C35	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass
C36	.1	300	8R9854	P288-1	DF-104	PTE4P1		2TM-P1	Video Coupling
C37	1000			SI1000	D6-102	1W5D1	GP2L-001	19C1	V. Amp. Cath. *
C38	1000			SI1000	D6-102	1W5D1	GP2L-001	19C1	V. Amp. Cath *
C39	30	500	21K470329		TCZ-30	5R5Q3	NPOL-30	MS-43	Fixed Trimmer
C40	.1	600	8R9874	P888-1	DF-104	PTE6P1		6TM-P1	Video Coupling
C41	5		21K70720	SI5	TCZ-4.7	5W5V5	GP1K-5	MS-55	S. IF Coupling
C42	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass
C43	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	1st S. IF Dec.
C44	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	1st S. IF Cath.
C45	5		21K70720	SI5	TCZ-4.7	5W5V5	GP1K-5	MS-55	S. IF Coupling
C46	75		21R490581	SI75N750	TCN-75		N750L-75		Fixed Trimmer
C47	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass
C48	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	2nd S. IF Dec.
C49	5000		21A470789	BPD-005	DD-502	1D5D5	811-005	29C1	2nd S. IF Cath.
C50	500	500	21R6590	1468-0005	D6-501	5W5T5	GP2K-500	1FM-35	Diode Load Cap
C51	.001	600	8R9866	P888-001	D6-101	PTE6D1	GP2L-001	6TM-D1	De-emphasis
C52	500	500	21R6590	1468-0005	D6-501	5W5T5	GP2K-500	1FM-35	Tone Comp.
C53	.01	600	8R9870	P888-01	D6-103	PTE6S1	821-01	6TM-S1	Audio Coupling
C54	.005	600	8R9869	P888-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C55	68	500	21R6650	SI68	D6-680	5W5Q7	GP1K-68	MS-47	AF Feedback
C56	100		21B77286	SI100	D6-101	5W5T1	GP1K-100	19C11	Sync. Coupling
C57	.005	600	8R9869	P888-005	D6-502	PTE6D5	811-005	6TM-D5	Sync. Coupling
C58	.05	600	8R9873	P888-05	DF-503	PTE6S5		6TM-S5	Sync. Coupling
C59	.005	600	8R9869	P888-005	D6-502	PTE6D5	811-005	6TM-D5	Vert. Sync. Coupling
C60	.005	600	8R9869	P888-005	D6-502	PTE6D5	811-005	6TM-D5	Voltage Divider
C61	.03	600	8R9872	P888-03		PTE6S3		6TM-S3	Integrator Net
C62	.005	600	8R9869	P888-005	D6-502	PTE6D5	811-005	6TM-D5	Fixed Trimmer

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C63	.05	600	8R9873	P688-05		PTE6S5		6TM-S5	Vert. Discharge
C64	.1	200	8R9854	P288-1		PTE4P1		2TM-P1	Vert. Discharge
C65	.15	400	8R9875	P488-15		GT4P2		4TM-P15	Vert. Sweep Coupling
C66	.01	600	8R9870	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Vert. Sweep Coupling
C67	.001	600	8R9866	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	Hor. Sync. Coupling
C68	.001	600	8R9866	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	Horiz. Sync. Coupling
C69	.005	600	8R9869	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Voltage Divider
C70	.01	1000	8R9881	P1088-01		PTE10S1		MB-S1	Horiz. Feedback
C71	.001	600	8R9866	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	AFC Filter
C72	.01	600	8R9870	P688-01	D6-103	PTE6S1	821-01	6TM-S1	AFC Filter
C73	.005	600	8R9869	P688-005		PTE6D5		6TM-D5	Fixed Trimmer
C74	330	500	21R2754	SI330	D6-331	5W5T3	GP2K-330	19C14	Horiz. MV Feedback
C75	100		21B77286	SI100	D6-101	5W5T1	GP1K-100	19C11	Horiz. MV Plate *
C76	680	500	21R2741	SI680	D6-681	1W5T7	GP2K-680	1FM-37	Horiz. Discharge
C77	.005	600	8R9869	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Horiz. Sweep Coupling
C78	.1	600	8R9874	P688-1	DF-104	PTE6P1		6TM-P1	Horiz. Output Screen Damper Plate
C79	150	3000	21K700620						
C80	.1	600	8R9874	P688-1		PTE6P1		6TM-P1	Damper Filter
C81	.35	600	8R9876	684-25		PTE7P25		6TM-P25	Horiz. Sweep Coupling
C82	10000			BPD-01	DD-103	PTE6S1	821-01	36C1	Line Filter *
C83	10000			BPD-01	DD-103	PTE6S1	821-01	36C1	Line Filter *
C84	.25	200		P488-25		GT2P25		2TM-P25	AGC Filter *

* Not Used In All Models.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	INSTALLATION NOTES
R1A	2000Ω	½	18A792009		RTV-112	SBBT-574-S	Contrast control - panel-tapped ⓐ 1500Ω and 1750Ω
B	1Meg	½					Volume control and SW - rear
R2A	30KΩ	½	18K701072	Q11-121	AG-42-S	B-26	Horizontal hold control
B	Shaft		Not req.	Not req.	RS-2	Not req.	Attach to R2A per instructions
R3A	100KΩ	½	18A791574	Q11-128	AG-49-S	B-40	Vertical hold control
B	Shaft		Not req.	Not req.	RS-2	Not req.	Attach to R3A per instructions
R4A	1Meg	½	18A90147	Q11-137	AG-61-S	AN-69	Brightness control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R4A per instructions
R5	2000Ω	2	18A790146	WK-2000	43-2000	VK-131	Vertical linearity control - wire wound
R6A	2Meg	½	18K701073	Q11-139	AG-83-S	AN-75	Vertical size control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R6A per instructions
R7	4000Ω	4	18K701115		RTV-10		Focus control - wire wound

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ±10% UNLESS OTHERWISE STATED
R8	22KΩ	½	6R6397		RF Amp. Grid
R9	56Ω	½	6R5614		RF Amp. Cathode
R10	1000Ω 20%	½	6R6301	BTS-1000	RF Amp. Screen
R11	3900Ω	½	6R6659	BTS-3900	RF Amp. Decoup
R12	22KΩ 20%	½	6R6028		Mixer Grid
R13	22KΩ 20%	½	6R6028		Mixer Grid
R14	15KΩ 20%	1	6R6271		Mixer Plate
R15	10KΩ	½	6R6320		Osc. Grid
R16	1000Ω 20%	½	6R6301	BTS-1000	Osc. Plate
R17	1000Ω 20%	½	6R6301	BTS-1000	AGC Network
R18	8200Ω	½	6R2004		1st Video IF Amp. Grid
R19	47Ω	½	6R5550		1st Video IF Amp. Cathode
R20	1000Ω 20%	½	6R6301	BTS-1000	1st Video IF Amp. Decoup
R21	22KΩ	½	6R6397		1st Video IF Transformer Shunt
R22	47Ω	½	6R5550		2nd Video IF Amp. Cathode
R23	1000Ω 20%	½	6R6301	BTS-1000	2nd Video IF Amp. Decoup
R24	8200Ω	½	6R2004		2nd Video IF Transformer Shunt
R25	120Ω	½	6R5551	BTS-120	3rd Video IF Amp. Cathode
R26	1000Ω 20%	½	6R6301	BTS-1000	3rd Video IF Amp. Decoup
R27	560Ω	½	6R6117	BTS-5600	Video Det. Load
R28	100KΩ 20%	½	6R6075	BTS-100K	Series Test Socket
R29	100KΩ 20%	½	6R6075	BTS-100K	Series Test Socket
R30	1.5Meg 20%	½	6R3966	BTS-1.5Meg	AGC Network
R31	1Meg 20%	½	6R6004	BTS-1Meg	Video Output Grid
R32	120Ω	½	6R5551	BTS-120	Video Compensation - See Note
R33	120Ω	½	6R5551	BTS-120	Video Compsensation - See Note
R34	39KΩ 5%	1	6R5588	BTA-39K-5%	Video Output Screen
R35	5600Ω	2	6R5765	BTB-5600	Video Output Plate
R36	1Meg 20%	½	6R6004	BTS-1Meg	Voltage Divider
R37	82KΩ	½	6R5644	BTS-82K	Picture Tube Grid
R38	100KΩ	½	6R6031	BTS-100K	Picture Tube Cathode
R39	220Ω	½	6R6270	BTS-220	1st Sound IF Amp. Cathode
R40	10KΩ	½	6R6230		1st Sound IF Amp. Plate
R41	1000Ω 20%	½	6R6301	BTS-1000	1st Sound IF Amp. Decoup
R42	220Ω	½	6R6270	BTS-220	2nd Sound IF Amp. Cathode
R43	1000Ω 20%	½	6R6301	BTS-1000	2nd Sound IF Amp. Decoup
R44	180Ω	½	6R5660	BTS-180	Balancing
R45	33KΩ 20%	½	6R6032	BTS-33K	De-emphasis
R46	6800Ω	½	6R6428	BTS-6800	Ratio Det. Diode Load
R47	6800Ω	½	6R6428	BTS-6800	Ratio Det. Diode Load
R48	4.7Meg 20%	½	6R2122	BTS-4.7Meg	AF Amp. Grid
R49	470KΩ 20%	½	6R6033	BTS-470K	AF Amp. Plate
R50	470KΩ 20%	½	6R6032	BTS-470K	Output Grid
R51	330Ω	½	6R6022	BTS-330	Output Cathode
R52	1500Ω 20%	2	6R2005	BTB-1500	Output Decoup
R53	270KΩ	½	6R6414	BTS-270K	Feedback
R54	15KΩ 20%	½	6R6477	BTS-15K	Isolation
R55	470KΩ 20%	½	6R6032	BTS-470K	Isolation
R56	2.2Meg	½	6R3927	BTS-2.2Meg	Sync. Sep. Grid
R57	47KΩ 20%	½	6R6056	BTS-47K	Sync. Sep. Plate
R58	270KΩ	½	6R6414	BTS-270K	Sync. Clipper Cathode

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R59	120KΩ	½	6R5631	BTS-120K	Sync. Clipper Plate
R60	22KΩ	½	6R6397	BTS-22K	Phase Inv. Grid
R61	2700Ω	½	6R5577	BTS-2700	Phase Inv. Cathode
R62	6800Ω	½	6R6428	BTS-6800	Phase Inv. Plate
R63	4700Ω	½	6R6080	BTS-4700	Voltage Divider
R64	22KΩ	½	6R6397	BTS-22K	Integrator
R65	4700Ω	1		BTA-4700	Integrator
R66	220KΩ 20%	½	6R6407	BTS-220K	Voltage Divider
R67	470KΩ 20%	½	6R6032	BTS-470K	Vert. Osc. Plate
R68	56KΩ	½	6R6378	BTS-56K	Vert. Osc. Plate Decoup
R69	10KΩ	½	6R6320	BTS-10K	Vert. Peaking
R70	3.3Meg 20%	½	6R2118	BTS-3.3Meg	Vert. Output Grid
R71	470Ω	½	6R6090	BTS-470	Vert. Output Cathode
R72	100Ω 20%	½	6R6018		Parasitic Supp
R73	15KΩ	½	6R6477	BTS-15K	Voltage Divider
R74	100KΩ	½	6R6031	BTS-100K	Horiz. Phase Det. Diode Load
R75	100KΩ	½	6R6031	BTS-100K	Horiz. Phase Det. Diode Load
R76	4.7Meg 20%	½	6R2122	BTS-4.7Meg	Horiz. Phase Det. Diode Load
R77	4.7Meg 20%	½	6R2122	BTS-4.7Meg	Horiz. AFC Filter
R78	5600Ω	½	6R6117	BTS-5600	Horiz. MV Plate
R79	1200Ω	½	6R6393	BTS-1200	Horiz. MV Cathode
R80	82KΩ	½	6R5644	BTS-82K	Horiz. MV Grid
R81	100KΩ	½	6R6031	BTS-100K	Horiz. MV Plate
R82	3900Ω	½	6R5659	BTS-3900	Horiz. Peaking
R83	470KΩ 20%	½	6R6032	BTS-470K	Horiz. Output Grid
R84	8200Ω	2	6R5725	BTB-8200	Horiz. Output Screen
R85	100KΩ	1	6R6328	BTA-100K	Horiz. Feedback
R86	100KΩ	1	6R6328	BTA-100K	Horiz. Feedback
R87	3.3Ω	½	17K485412		HV Rectifier Filament
R88	5000Ω	5	17K791597	1 3/4A-5000	Filter - Wire Wound
R89	375Ω	10	17K700782	1 3/4A-400	Focus Coil Shunt - Wire Wound
R90	1500Ω 20%	2		BTB-1500	Focus Coil Shunt - See Note
R91	1000Ω 20%	½	6R6301	BTS-1000	Decoup - See Note
R92	18KΩ				4th Video IF Transformer Shunt - See Note

Note: Not Used In All Models.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T1	117VAC ⓐ 1.85A	700VCT .380ADC	5VAC ⓐ 3A	6.3VAC ⓐ 1.2A SEC. 4 6.3VAC ⓐ 8.2A	25C701127			

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	NOTES
T2	52Ω	33Ω	25K701069		A-3000 ①		Vertical Block
T3	200Ω tapped ⓐ 1.8Ω, 7Ω 14Ω, 22Ω	0Ω	24C701636				Horiz. Output
T4	580Ω	11.5Ω	25K701068	A-8113			Vert. Output
T5A	13Ω		24C701069	DY-7	MD-70F		Horiz. Deflection Coil
B	67Ω						Vert. Deflection Coil
T6	270Ω		24K701020				Focus Coil

① Drill one new mtg hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	INSTALLATION NOTES
T7	4.2KΩ	4.1Ω	300Ω	.3Ω	25K701032	A3877	A2930	RO-9 ①	① Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS: FIELD RES.	RATINGS: V. C. IMP.	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: JENSEN PART No.	REPLACEMENT DATA: QUAM PART No.	NOTES
SP1	PM	4.1Ω	50C701807	ST-10Z Mod. P12-S	12A4	
	CONE DIA.	V. C. DIA.				
SP2	11 3/8"	1"				

PARTS LIST CONTINUED ON PAGE 15

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∽)	MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.270A	54Ω	1.3 Henries	25B701075	C-2326 ①	C-2996 ①	TR3300 ①	① Drill one new mtg. hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA			NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	IRC PART No.	
L2	Ant. Matching coil	.1Ω		24A790033			
L3	Ant. Coil	0Ω		24K701132			Low frequency primary
L4	Ant. Coils	0Ω		24C701131			Channels 2 thru 6
L5	Fil. Choke	.2Ω		24K790145		CLA	.47 Microhenry
L6	Fil. Choke	0Ω		24K701129			
L7	RF Coil	0Ω		24K701304			Channel 13
L8	RF Coils	0Ω		24C701302			Channels 2 thru 6
L9	Cathode Choke	2Ω		24K701198		CL-1	
L10	Osc. Coil	0Ω		24K701303			Channel 13
L11	Osc. Coils	0Ω		24C701128			Channel 2 thru 6
L12	RF Choke	0Ω		24K701130			
L13	Conv. Plate Coil	.2Ω		24K701015			Less Slug
L14	IF Trap	0Ω		24B791592			Less Slug
L15	1st Video IF	.2Ω		24K701015			Less Slug
L16	IF Trap	0Ω		24B791592			Less Slug
L17	2nd Video IF	.7Ω	.7Ω	24K701016			Less Slug
L18	Fil. Choke	0Ω		24A791081			.9 Microhenry
L19	3rd Video IF	.7Ω	.7Ω	24K701016			Less Slug
L20	4th Video IF	.7Ω	.7Ω	24K701564			Less Slug
L21	Fil. Choke	0Ω		24A791081			.9 Microhenry
L22	Peaking	6Ω		24K701017			White Dot Wound On 22KΩ Resistor
L23	Peaking	9Ω		24K701018			Blue Dot Wound On 15KΩ Resistor
L24	Peaking	11Ω		24K701019			Black Dot Wound On 15KΩ Resistor
L25	4.5MC Trap	2.5Ω		24B792735			Less Slug
L26	Peaking	11Ω		24K701019			Black Dot Wound On 15KΩ Resistor
L27	1st Sound IF	6Ω		24K701849			White-White Dots Wound On 1Meg Resistor
L28	2nd Sound IF	1.2Ω		24A470159			Less Slug
L29	Ratio Det. Trans	2.8Ω	.4Ω	24B790125			Complete Less Shield
L30	Hor. Osc. Coil	42Ω		24K701559			Less Slug
L31	Horiz. Size	8Ω		24K701566			Less Slug

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1	RF Tuner	1X701180	Complete With Tubes
M2	Fuse	65A700851	.25A 250V Type 3AG
M3A	Ion Trap	24A792821	
B	Ion Trap	24A792827	
	Safety Glass	61C701329	Models 20F1, 20F1B
	Safety Glass	61C792086	Models 19K2, 19K2B, 19K3, 19K4, 19K4B
	Knob	36K701088	Channel Selector Models 20F1, 20F1B, 19K2, 19K2B
	Knob	36C700886	Channel Selector Model 19K3
	Knob	36C700889	Channel Selector Models 19K4, 19K4B
	Knob	36C700894	Fine Tuning- Volume Models 20F1, 20F1B, 19K2
	Knob	36C700888	Fine Tuning- Volume Model 19K3
	Knob	36C700891	Fine Tuning - Volume Models 19K4, 19K4B
	Knob	36K701087	Contrast Models 20F1, 20F1B, 19K2
	Knob	36K700887	Contrast Model 19K3
	Knob	36K700890	Contrast Models 19K4, 19K4B

PHOTOFACT* Folder

*TRADE MARK

PACKARD-BELL MODELS

2601-TV, 2692-TV

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Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL 2601-TV

PACKARD-BELL MODELS

2601-TV, 2692-TV

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Date 1/51 Set No. 122—Folder No. 6

PACKARD - BELL MODEL 2601-TV

TRADE NAME	Packard - Bell Models 2601-TV, 2692-TV
MANUFACTURER	Packard - Bell Co., 12333 W. Olympic Blvd., Los Angeles, Calif.
TYPE SET	Television Receiver
TUBES	Twenty-Six
POWER SUPPLY	110-120 Volts AC - 60 Cycle — RATING 2.44 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13

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PACKARD-BELL
MODELS 2601-TV, 2692-TV

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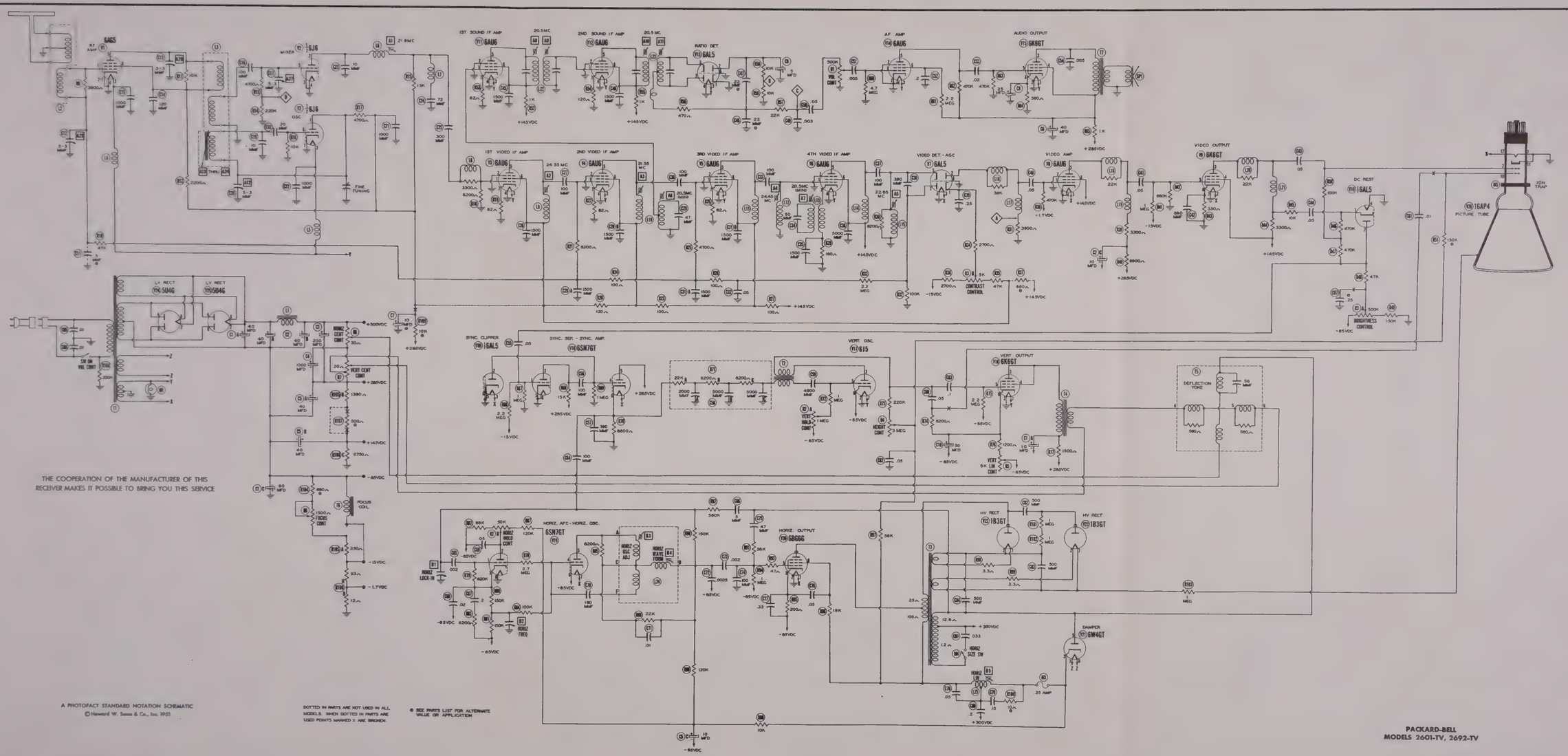
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MODELS 2601-TV, 2692-TV
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A PHOTOFACT STANDARD NOTATION SCHEMATIC
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SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
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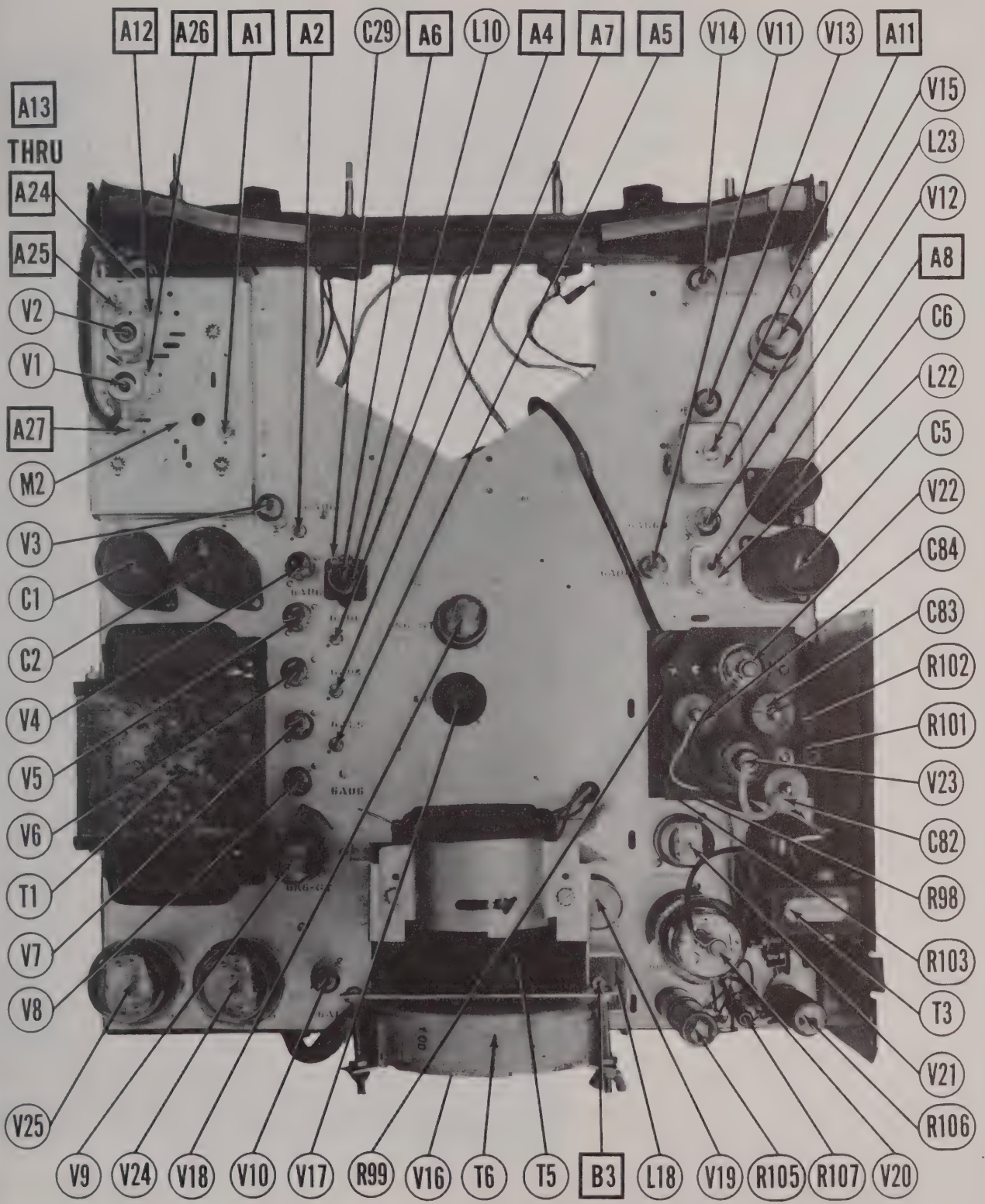
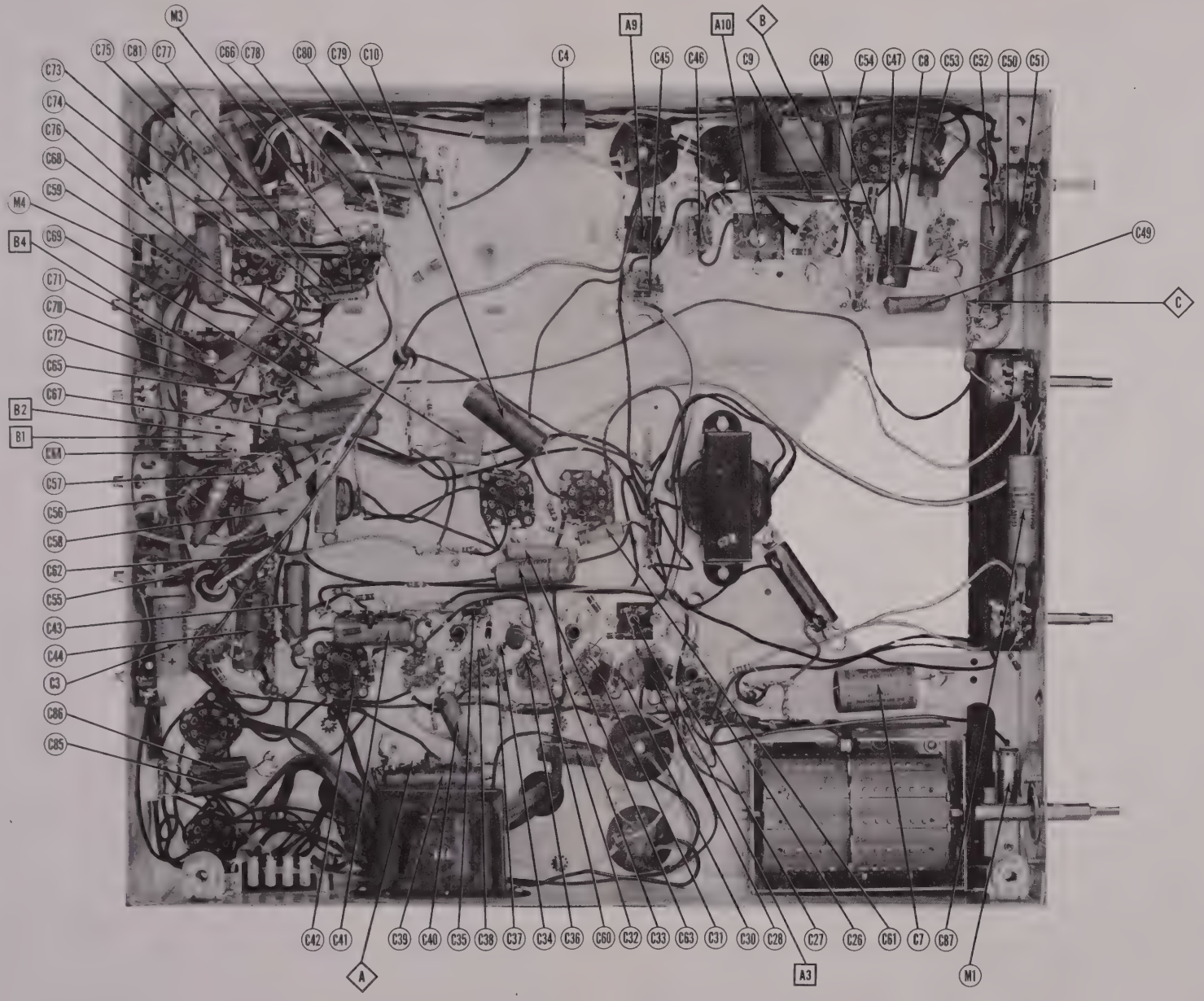
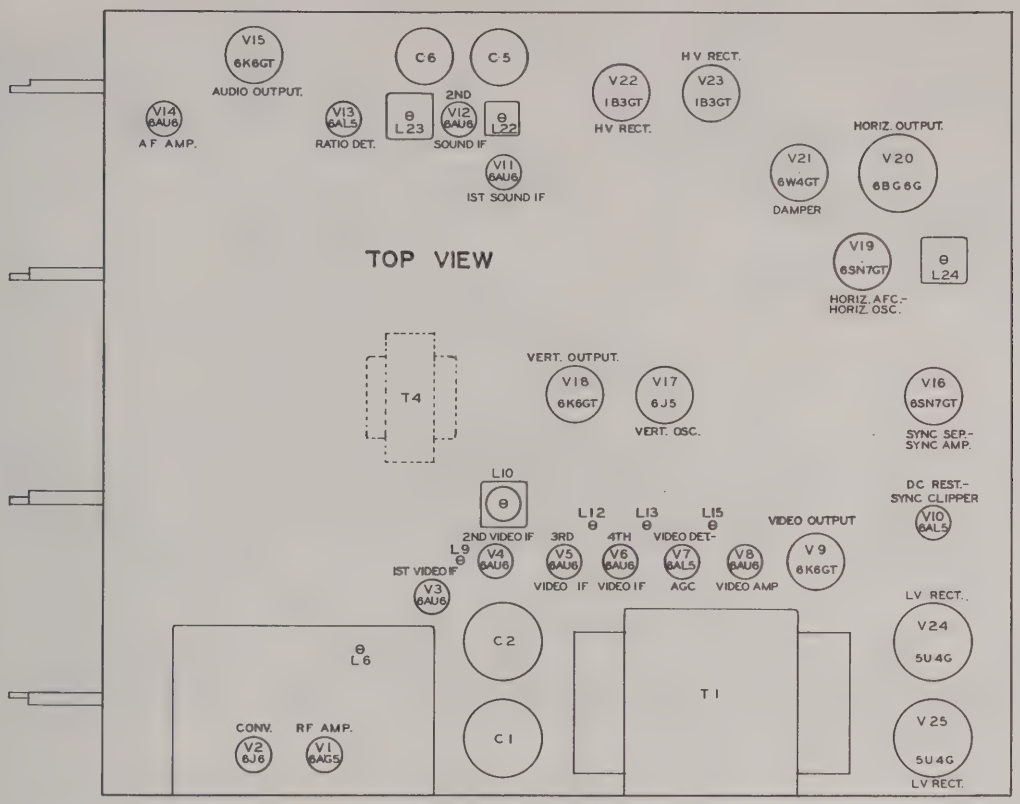
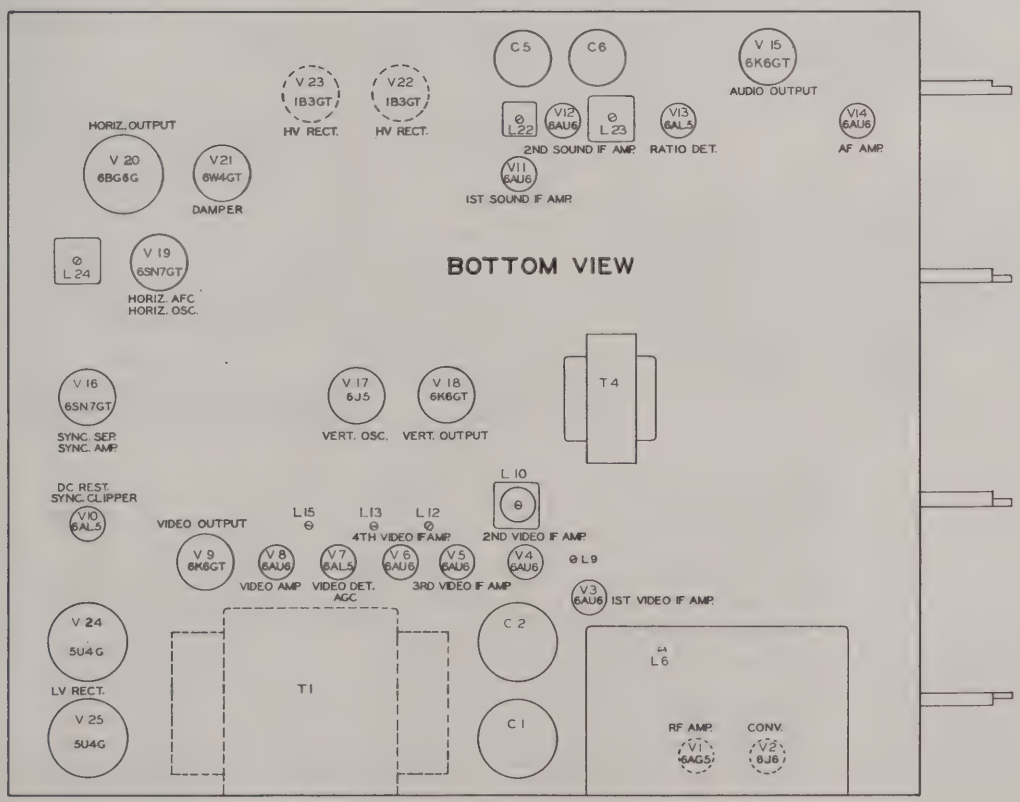


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V19) from its socket.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) and replace it with a 6J6 which has pin 1 removed. This will disable the local oscillator and prevent the possibility of erroneous indications.

Connect the DC probe of the VTVM to the junction of R28 and C18A, common to chassis. Adjust the contrast control until the VTVM reads -3 volts.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	21.8MC (Unmod.)	Any	DC Probe to Point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	Direct	"	24.55MC	"	"	A2	"
3.	Direct	"	21.55MC	"	"	A3	"
4.	Direct	"	24.65MC	"	"	A4	"
5.	Direct	"	22.65MC	"	"	A5	"
6.	Direct	"	20.5MC	"	"	A6, A7	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	23MC (10MC SWP)	20.5MC 21.55MC 25.0MC	Any	Vert. Amp. to Point (A). Low side to chassis.		Check for response curve similar to figure 1. If necessary retouch A1 thru A5 for proper response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	20.5MC (Unmod.)	Any	DC Probe to Point (B). Common to chassis.	A8, A9, A10	Adjust for maximum deflection.
9.	Direct	"	"	"	DC Probe to Point (C). Common to Point (B).	All	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	20.5MC (450KC SWP)	20.5MC	Any	Vert. Amp. to Point (B). Low side to chassis.	A8, A9, A10	Disconnect stabilizer capacitor C8. Adjust for maximum amplitude and symmetry as per figure 2.
9.	Direct	"	"	"	"	Vert. Amp. to Point (C). Low side to chassis.	All	Reconnect capacitor C8. Adjust A-11 so 20.5MC occurs at center of crossover lines as per figure 3. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.

The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

Set the fine tuning control to the mid-position of its range.

The overall oscillator adjustment A12 should not be adjusted unless one of the channel strip adjustments shows insufficient range. If A12 is changed it will be necessary to readjust ALL of the channel strip adjustments.

The channel strip adjustment screws are accessible through a hole just to the right of the channel switch shaft. The correct adjustment is accessible through this hole as the channel switch is turned to each channel.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	215.75MC (Unmod.)	13	DC Probe to Point (C). Common to Point (B).	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
			209.75MC	12		A14	
			203.75MC	11		A15	
			197.75MC	10		A16	
			191.75MC	9		A17	
			185.75MC	8		A18	
			179.75MC	7		A19	
			87.75MC	6		A20	
			81.75MC	5		A21	
			71.75MC	4		A22	
			65.75MC	3		A23	
			59.75MC	2		A24	

ALIGNMENT INSTRUCTIONS (CONT.)

RF AND MIXER ALIGNMENT

The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	207MC (10MC SWP)	205.25MC 209.75MC	12	Vert. Amp. to Point ◇. Low side to chassis.	A25, A26, A27	Adjust for response curve similar to figure 4 with markers at 90%.
12.	"	"	213MC (10MC SWP)	211.25MC 215.75MC	13	"		Check all channels for response curve similar to figure 4. If markers fall below 70% on any channel, make slight adjustment of A25, A26 and A27 with channel selector set for that channel. Recheck all channels to see that they have not been seriously effected.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
			85MC (10MC SWP)	83.25MC 87.75MC	6			
			79MC (10MC SWP)	77.25MC 81.75MC	5			
			69MC (10MC SWP)	67.25MC 61.25MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

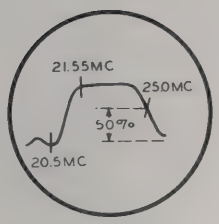


FIG. 1

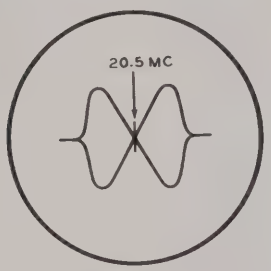


FIG. 2

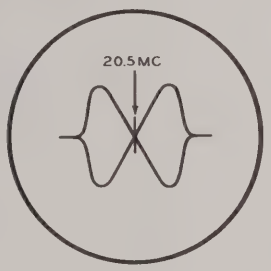


FIG. 3

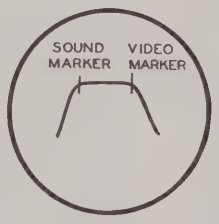


FIG. 4

DISASSEMBLY INSTRUCTIONS

1. Remove seven push-on type control knobs.
2. Remove ten wood screws holding rear cover in place.
3. Disconnect built-in antenna.
4. Remove antenna terminal strip.
5. Disconnect speaker leads.
6. Remove four 7/16" hex head screws holding chassis in cabinet. Remove chassis.
7. Remove four phillips head screws holding speaker to cabinet. Remove speaker.

NOTE: FOR PICTURE TUBE REMOVAL, IT IS NECESSARY TO REMOVE CHASSIS AS OUTLINED ABOVE.

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.8VDC	0V	6.3VAC	0V	165VDC	165VDC	0V		
V 2	6J6	130VDC	105VDC	6.3VAC	0V	-1.3VDC	§-6.8VDC	0V		
V 3	6AU6	0V	0V	6.3VAC	0V	140VDC	140VDC	.8VDC		
V 4	6AU6	-.8VDC	0V	6.3VAC	0V	142VDC	142VDC	0V		
V 5	6AU6	-.8VDC	0V	6.3VAC	0V	145VDC	145VDC	0V		
V 6	6AU6	0V	0V	6.3VAC	0V	145VDC	145VDC	1.7VDC		
V 7	6AL5	-5.5VDC	-.2VDC	6.3VAC	0V	0V	0V	-5.5VDC		
V 8	6AU6	-.8VDC	0V	6.3VAC	0V	225VDC	145VDC	0V		
V 9	6K6GT	0V	6.3VAC	105VDC	145VDC	-2.5VDC	0V	0V	5VDC	
V 10	6AL5	-75VDC	-.4VDC	6.3VAC	0V	0V	0V	-85VDC		
V 11	6AU6	0V	0V	6.3VAC	0V	135VDC	135VDC	.8VDC		
V 12	6AU6	0V	0V	6.3VAC	0V	135VDC	135VDC	1.4VDC		
V 13	6AL5	0V	-.2VDC	6.3VAC	0V	-.2VDC	0V	-.2VDC		
V 14	6AU6	-.6VDC	0V	6.3VAC	0V	95VDC	30VDC	0V		
V 15	6K6GT	0V	0V	235VDC	250VDC	0V	0V	6.3VAC	17VDC	
V 16	6SN7GT	-1.3VDC	170VDC	0V	-.4VDC	285VDC	14VDC	6.3VAC	0V	
V 17	6J5	0V	0V	320VDC 35VDC	-85VDC -50VDC	-200VDC	-120VDC	6.3VAC	-85VDC	
V 18	6K6GT	0V	0V	255VDC	255VDC	-85VDC	-65VDC -35VDC	6.3VAC	-70VDC -40VDC	
V 19	6SN7GT	-75VDC	35VDC	-85VDC	-145VDC	125VDC	-85VDC	6.3VAC	0V	
V 20	6BG6G	0V	0V	-60VDC	0V	-75VDC	-75VDC	6.3VAC	95VDC	TOP CAP *
V 21	6W4GT	0V	0V	410VDC	300VDC	295VDC	125VDC	¶	¶	
V 22	1B3GT	* DO NOT MEASURE								
V 23	1B3GT	* DO NOT MEASURE								
V 24	5U4G	0V	320VDC	0V	285VAC	0V	285VAC	0V	320VDC	
V 25	5U4G	0V	320VDC	0V	285VAC	0V	285VAC	0V	320VDC	
V 26	16AP4	0V	-80VDC	PIN 10 385VDC	PIN 11 0V	PIN 12 6.3VAC				

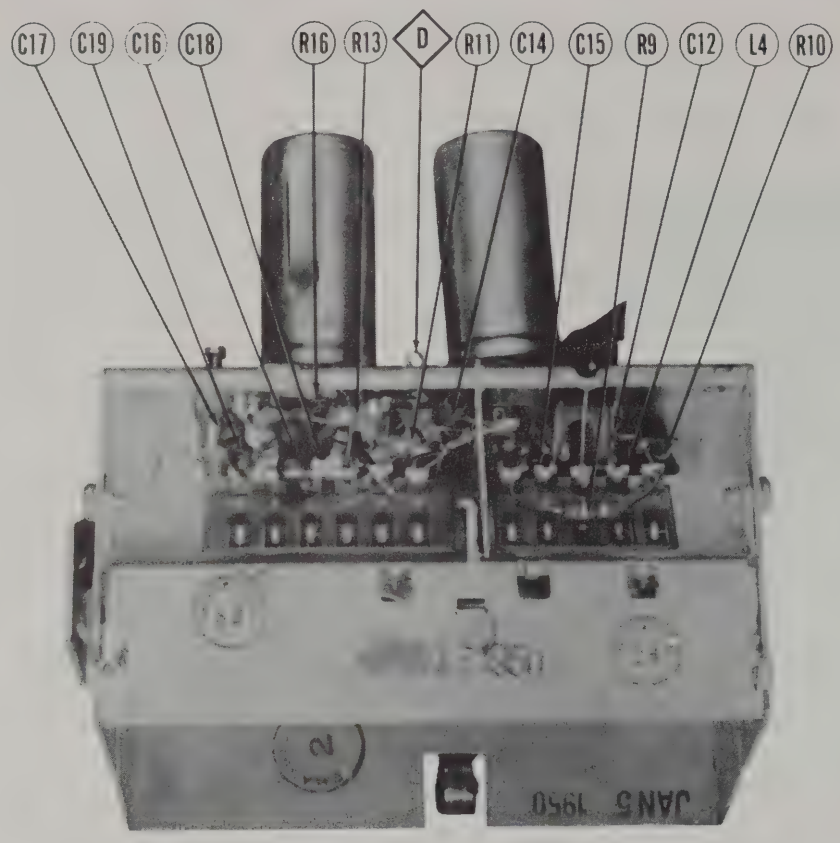
FOCUS CONTROL COUNTERCLOCKWISE
CENTERING CONTROLS SET AT MID-WAY POSITION
§ TAKEN WITH VACUUM TUBE VOLTMETER
¶ 6.3VAC MEASURED ACROSS FILAMENTS
* DO NOT MEASURE

RESISTANCE READINGS

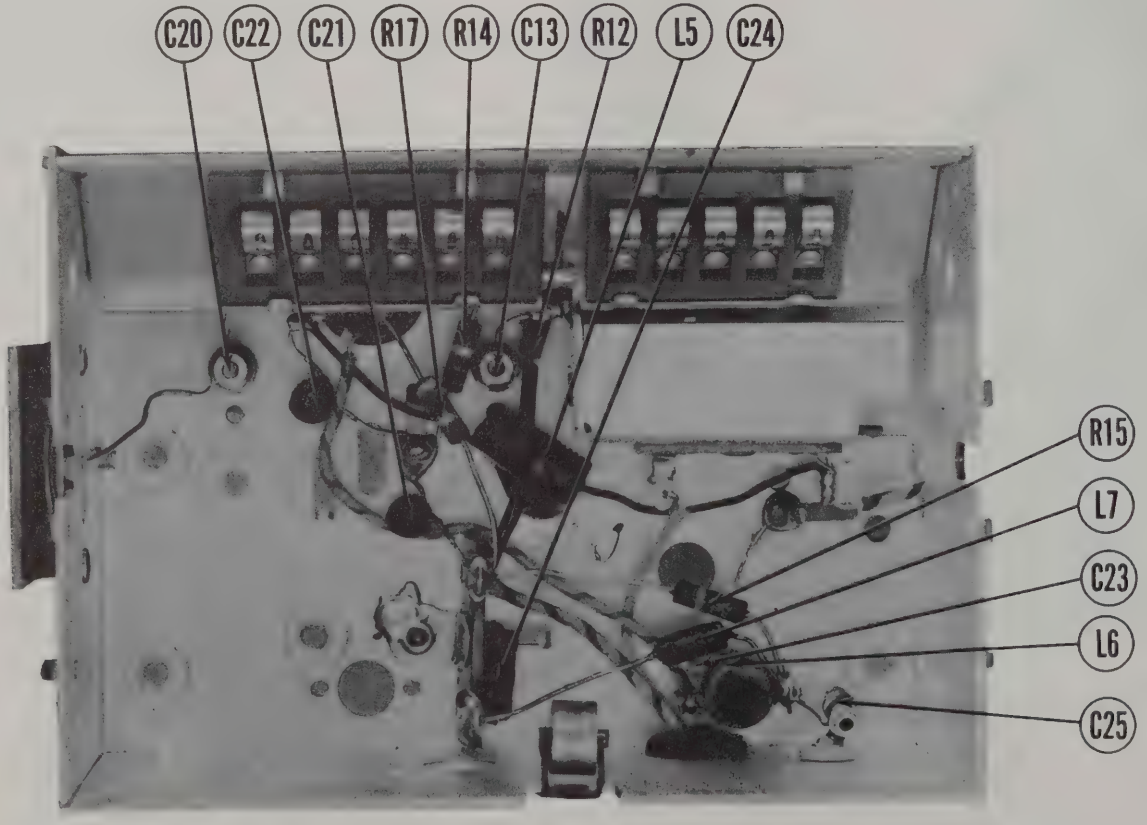
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	2.3 Meg.	0Ω	.1Ω	0Ω	†12KΩ	†12KΩ	0Ω		
V 2	6J6	†15KΩ	†25KΩ	.1Ω	0Ω	225KΩ	10KΩ	0Ω		
V 3	6AU6	8.2KΩ	0Ω	.1Ω	0Ω	†2.3KΩ	†2.3KΩ	82Ω		
V 4	6AU6	2.3 Meg.	0Ω	.1Ω	0Ω	†2.2KΩ	†2.2KΩ	82Ω		
V 5	6AU6	2.3 Meg.	0Ω	.1Ω	0Ω	†2.1KΩ	†2.1KΩ	82Ω		
V 6	6AU6	.5Ω	0Ω	.1Ω	0Ω	†2KΩ	†2KΩ	180Ω		
V 7	6AL5	5.5KΩ	3.9KΩ	.1Ω	0Ω	.5Ω	0Ω	100KΩ		
V 8	6AU6	470KΩ	0Ω	.1Ω	0Ω	†10KΩ	†2KΩ	0Ω		
V 9	6K6GT	Inf.	.1Ω	†5.3KΩ	†2KΩ	400KΩ	Inf.	0Ω	330Ω	
V 10	6AL5	1 Meg.	1 Meg.	.1Ω	0Ω	0Ω	0Ω	50KΩ		
V 11	6AU6	0Ω	0Ω	.1Ω	0Ω	†3KΩ	†3KΩ	82Ω		
V 12	6AU6	.2Ω	0Ω	.1Ω	0Ω	†3KΩ	†3KΩ	120Ω		
V 13	6AL5	0Ω	20KΩ	.1Ω	0Ω	Inf.	0Ω	Inf.		
V 14	6AU6	4.7 Meg.	0Ω	.1Ω	0Ω	†470KΩ	†2.2 Meg.	0Ω		
V 15	6K6GT	0Ω	0Ω	†1.6KΩ	†1.1KΩ	470KΩ	.6Ω	.1Ω	560Ω	
V 16	6SN7GT	685KΩ	†15KΩ	0Ω	1 Meg.	†85Ω	6.8KΩ	.1Ω	0Ω	
V 17	6J5	0Ω	0Ω	#275KΩ #2.8 Meg.	5.5KΩ 500Ω	2 Meg.	1 Meg.	.1Ω	500Ω	
V 18	6K6GT	Inf.	0Ω	†2.5KΩ	†2.5KΩ	2.2 Meg.	10KΩ 15KΩ	.1Ω	6.7KΩ 1.7KΩ	
V 19	6SN7GT	900KΩ	#180KΩ	300KΩ	250KΩ	#130KΩ	500Ω	.1Ω	0Ω	
V 20	6BG6G	Inf.	0Ω	700Ω	Inf.	1 Meg.	1 Meg.	.1Ω	#18KΩ	TOP CAP #112Ω
V 21	6W4GT	Inf.	Inf.	200KΩ	†50Ω	†40Ω	#130KΩ	Inf.	Inf.	
V 22	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #138Ω
V 23	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP Inf.
V 24	5U4G	Inf.	9KΩ	Inf.	500Ω	Inf.	500Ω	Inf.	9KΩ	
V 25	5U4G	Inf.	9KΩ	Inf.	500Ω	Inf.	500Ω	Inf.	9KΩ	
V 26	16AP4	0Ω	650KΩ	PIN 10 #205KΩ	PIN 11 0Ω	PIN 12 .1Ω				

FOCUS CONTROL COUNTERCLOCKWISE
CENTERING CONTROLS SET AT MID-WAY POSITION
† MEASURED FROM PIN 2 OF V25
# MEASURED FROM PIN 3 OF V21

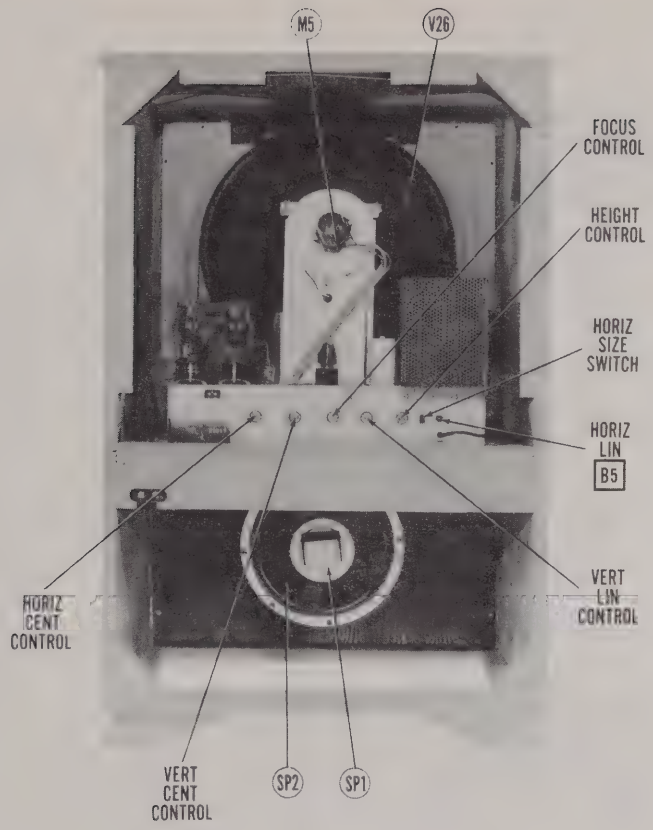
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Pre-set the adjustments as follows:

Horizontal lock trimmer (B1) 3/4 turn counter clockwise from fully in.

Horizontal frequency trimmer (B2) 1 1/2 turn counter-clockwise from fully in.

Horizontal oscillator coil slug (B3) and horizontal waveform slug (B4) to the mid position of their travel.

Turn the set on and tune in a TV station, preferably a test pattern.

Turn the horizontal hold control to maximum clockwise.

Adjust B2 and B3 alternately until picture is just out of sync and shows one vertical bar in the picture.

Turn the hold control 1/4 turn counter-clockwise to synchronize the picture. Examine the linearity of the picture and, if necessary, adjust the horizontal linearity slug (B5) until the picture is symmetrical from left to right. If B5 is adjusted, repeat adjustment of B2 and B3.

Connect the vertical input lead of an oscilloscope through a 1 megohm resistor to terminal C of L24.

Adjust B4 until the broad and narrow peaks of the waveform are of equal height as shown in figure 5.

If necessary, turn the horizonatal hold control to keep the picture synchronized while adjusting B4. Remove the oscilloscope.

Turn the hold control to maximum clockwise.

Interrupt the signal by switching to another channel and back again.

Slowly turn the hold control counter-clockwise and carefully note the least number of bars present just before the picture synchronizes.

If more than 3 bars are present at the pull in point, adjust B1 slightly counter-clockwise and repeat the check.

Turn the hold control to maximum clockwise, the picture should be out of synchronization to the extent of showing one vertical bar.

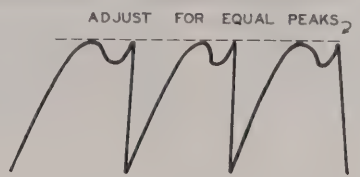


FIG. 5

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PACKARD BELL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.		6AG5	6AG5	7BD
V2	Converter		6J6	6J6	7BF
V3	1st Video IF Amp.		6AU6	6AU6	7BK
V4	2nd Video IF Amp.		6AU6	6AU6	7BK
V5	3rd Video IF Amp.		6AU6	6AU6	7BK
V6	4th Video IF Amp.		6AU6	6AU6	7BK
V7	Video Det.-AGC		6AL5	6AL5	6BT
V8	Video Amp.		6AU6	6AU6	7BK
V9	Video Output		6K6GT	6K6GT	7S
V10	DC Rest.-Sync. Clipper		6AL5	6AL5	6BT
V11	1st Sound IF Amp.		6AU6	6AU6	7BK
V12	2nd Sound IF Amp.		6AU6	6AU6	7BK
V13	Ratio Det.		6AL5	6AL5	6BT
V14	AF Amp.		6AU6	6AU6	7BK
V15	Audio Output		6K6GT	6K6GT	7S
V16	Sync. Sep.-Sync. Amp.		6SN7GT	6SN7GT	8BD
V17	Vert. Oscillator		6J5	6J5	6Q
V18	Vert. Output		6K6GT	6K6GT	7S
V19	Hor. AFC-Hor. Oscillator		6SN7GT	6SN7GT	8BD
V20	Horiz. Output		6BG6G	6BG6G	5BT
V21	Damper		5W4GT	5W4GT	4CQ
V22	HV Rectifier		1B3GT	1B3GT	3C
V23	HV Rectifier		1B3GT	1B3GT	3C
V24	LV Rectifier		5U4G	5U4G	5T
V25	LV Rectifier		5U4G	5U4G	5T
V26	Picture Tube		16AP4	16AP4	12D

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PACKARD BELL PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	24049	AFH82J15E		UP9CJ15		TVL-3761	▲ Filter
B	10	450							■ Vert. Output Dec.
C	80	150							▪ Filter
C2A	40	450	24048	AFH882J		UP9CJ897		TVL-3785	▲ Filter
B	40	450							■ Filter
C	10	500							▪ V. Amp. Plate Dec.
C3	250	10	24044	PRS12/250		BRH1225A		TVA-1131	Hor. Cent. Cont. Bypass
C4	1000	6	24045	PRS6/1000		BRH610		TVA-1104	Vert. Cent. Cont. Bypass
C5A	40	450	24048	AFH882J		UP9CJ897		TVL-3785	▲ Filter
B	40	450							■ Filter
C	10	500							● Decoupling
C6	40	450	24014	AFH8J		UP4045		TVL-1725	Decoupling
C7	10	450		PRS450/10		BR1045A		TVA-1705	Decoupling ●
C8	5	50	24038	PRS150/4		BR550		TVA-1303	Stabilizing Cap
C9	25	25	24008	PRS25/25		BR525A		TVA-1205	Output Cathode
C10	50	50	24042	PRS50/50		BR505		TVA-1308	Vert. Output Cathode
C11	5			SI15NPO	TCZ-4.7		NPOK-5		Fixed Trimmer *
C12	.5-3				829-3				Variable Trimmer
C13	.5-3				829-3				Variable Trimmer
C14	120			SI120	D6-121		GP2K-120	19C29	RF Amp. Dec.
C15	1000			SI1000	D6-102		GP2L-001	19C1	RF Amp. Fil.
C16	100			SI100N750	TCN-100		N750L-100	29C16	RF Coupling
C17	.5-3				829-3				Variable Trimmer
C18	20			SI20NPO	TCZ-20		NPOK-20		Osc. Grod Cap
C19	10			SI10N750	TCN-10		N750K-10	19C4	Fixed Trimmer
C20	.5-3				829-3				Variable Trimmer
C21	1000			BPD-001	DD-102		801-001	19C1	RF Bypass
C22	1000			BPD-001	DD-102		801-001	19C1	Conv. Fil. Bypass
C23	10			SI10NPO	TCZ-10		NPOK-10	19C3	Fixed Trimmer
C24	72	500							Fixed Trimmer
C25	300			SI300	D6-301		GP2K-300	19C14	IF Coupling
C26	1500		23936	SI1500	D6-152	1W5D15	GP2L-0015	29C8	1st V. IF Dec.
C27	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C28A	1500		23954	BPD-2X0015	DD-2-152	1W5D15	812-2X0015	29C6	AGC Filter
B	1500					1W5D15			2nd V. IF Dec.
C29	47			SI47NPO	TCZ-47		NPOM-47	29C14	Fixed Trimmer
C30	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C31A	1500		23954	BPD-2X0015	DD-2-152	1W5D15	812-2X0015	29C6	AGC Filter
B	1500					1W5D15			3rd V. IF Dec.
C32	.05	200	23017	P288-05	DF-503	PTE485		2TM-S5	AGC Filter
C33	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C34	50						N680L-50		Fixed Trimmer
C35	1500		23936	SI1500	D6-152	1W5D15	GP2L-0015	29C8	4th V. IF Cathode
C36	5000		23931	BPD-005	DD-502	1D5D5	811-005	29C1	4th V. IF Dec.
C37	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C38	390		23945	SI390	D6-391	5W5T4	GP2K-390	1FM-34	IF Coupling
C39	.25	200	23021	P488-25		GT2P25		2TM-P25	DAGC Dec.
C40	.05	200	23017	P288-05	DF-503	PTE485		2TM-S5	Video Coupling
C41	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Video Coupling
C42	680		23946	SI680	D6-681	1W5T7	GP2K-680	19C17	Video Output Cathode
C43	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Video Coupling
C44	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Video Coupling
C45	1500		23936	SI1500	D6-152	1W5D15	GP2L-0015	29C8	1st S. IF Dec.
C46	1500		23936	SI1500	D6-152	1W5D15	GP2L-0015	29C8	2nd S. IF Dec.
C47	22		23911	SI22	D6-220	5W5Q25	GP1K-22	19C23	Diode Load Cap †
C48	22		23911	SI22	D6-220	5W5Q25	GP1K-22	19C23	Diode Load Cap †
C49	.003	600	23018	P688-003	D6-302	PTE6D3	GP2M-003	6TM-D3	De-emphasis
C50	.05	200	23017	P288-05	DF-503	PTE485		2TM-S5	Audio Coupling
C51	.005	600	23004	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C52	.2	400	23020	P488-22		GT4P2		4TM-P22	AF Amp. Screen
C53	.02	600	23007	P688-02	DF-303	PTE682		6TM-S2	Audio Coupling
C54	.005	1000	23004	P1088-005		PTE16D5		MB-D5	Output Plate Bypass
C55	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Sync. Coupling
C56	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	Sync. Coupling
C57	390		23945	SI390	D6-391	5W5T4	GP2K-390	1FM-34	Sync. Amp. Cath.

CAPACITORS (CONT.)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CENTRALAB PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C58A	2000		† 23951	P688-002	†	PTE6D2	GP2M-002	6TM-D2	Integrator Net
B	5000			P688-005	PC-100	PTE6D5	811-005	6TM-D5	Integrator Net
C	5000			P688-005		PTE5D5	811-005	6TM-D5	Integrator Net
C59	4900	500	23207	1467-005	D6-502	1D5D5	811-005	1FM-25	Vert. Osc. Grid
C60	.05	600	23010	P688-05		PTE685		6TM-S5	Vert. Discharge
C61	.01	600	23023	P688-01	D6-103	PTE681	821-01	6TM-S1	Vert. Sweep Coupling ‡
C62	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Decoupling ▲
C63	.1	400	23011	P488-1	DF-104	PTE4P1		4TM-P1	Vert. Sweep Coupling
C64	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	Hor. Sync. Coupling ▪
C65	.002	600	23002	P688-002	D6-202	PTE6D2	GP2M-002	6TM-D2	Hor. Sync. Coupling
C66	5		23908	SI5	TCZ-4.7	5W5Y5	GP1K-5	MS-55	Horiz. Feedback
C67	.2	400	23020	P488-22		GT4P2		4TM-P22	AFC Filter
C68	.02	600	23007	P688-02	DF-203	PTE682		6TM-S2	AFC Filter
C69	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Hor. AFC Plate
C70	180	600	23216	SI180	D6-181	5R572	GP2K-180	MS-32	Hor. Osc. Grid
C71	.01	600	23023	P688-01		PTE6S1	821-01	6TM-S1	Fixed Trimmer
C72	.0025	600	23033	1464-0025		1R5D25			Horiz. Discharge
C73	.002	600	23002	P688-002	D6-202	PTE6D2	GP2M-002	6TM-D2	Hor. Sweep Coupling
C74	100		23914	SI100	D6-101	5W5T1	GP1K-100	19C11	Hor. Output Grid
C75	47	1500	23956	1469-HV-0000S					Horiz. Feedback
C76	.05	600	23010	P688-05	DF-503	PTE685		6TM-S5	Hor. Output Screen
C77	.33	200	23032	P288-33		GT2P25		2TM-P25	Hor. Output Cath.
C78	.05	200	23017	P288-05		PTE485		2TM-S5	Damper Filter
C79	.15	200	23028	P288-15				2TM-P15	Damper Filter
C80	.2	400	23020	P488-22		GT4P2		4TM-P22	Damper Filter
C81	.033	600	23031	P688-033		PTE683		6TM-S3	Fixed Trimmer
C82	500	10000	23938	HV10C	TV3-501				Voltage Doubler Cap
C83	500	10000	23938	HV10C	TV3-501				H.V. Filter
C84	500	10000	23938	HV10C	TV3-501				H.V. Filter
C85	.01	125VAC	23932	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Line Filter
C86	.01	125VAC	23932	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Line Filter
C87	.25	200	23021	P488-25		GT2P25		2TM-P25	Bias Filter ‖

* Not used in all models.
† When either Item C47 or C48 are replaced both with capacitors of equal value.
‡ Items C58A, C58D, C58C, R71A, R71B and R71C arecombined into one unit.
‖ Used only in model 260I.
▲ Some models use 10MFD. in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: Packard Bell PART No.	REPLACEMENT DATA: IRC PART No.	REPLACEMENT DATA: CLAROSTAT PART No.	REPLACEMENT DATA: CENTRALAB PART No.	INSTALLATION NOTES
R1A	500KΩ	½	25022	Q13-133	AG-60-Z	B-60-S	Volume control
B	Shaft		Not req.	Not req.	FS-3	Not req.	Attach to R1A per instructions
C	Switch		Not req.	76-1	SWB	Not req.	Attach to R1A per instructions
R2A	1Meg	½	25830	Concentrikit B11-137 *	RTV-21	SBB-619	Vert. hold control - panel
B	50KΩ	½		B11-123 *			Horizontal hold control - rear
C	Shaft End			E-202 *			Attach per instructions in "Concentrikit"
R3A	500KΩ	½	25821	Concentrikit B11-133 *	RTV-169	SBB-620	Brightness control - panel
B	5000Ω	½		B11-114 *			Contrast control - rear
C	Shaft End			E-202 *			Attach per instructions in "Concentrikit"
R4A	3Meg	½	25805D	Q11-140	AM-67-Z	AN-84	Height control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R4A per instructions
R5A	5000Ω	½	25807B	Q11-114	AM-19-S	AN-10	Vert. linearity control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R5A per instructions
R6	1500Ω	4	25812		RTV-6	VK-130	Focus control - wire wound
R7	20Ω	2	25808A	W-20X10	RTV-3	SVT-901	Vert. centering control - wire wound tapped @ 10Ω
R8	30Ω	2	25828	W-30	43-30	VK-112	Horiz. centering control- wire wound

* Additional parts to be used in concentrikit.

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PACKARD BELL PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES: ALL RESISTORS ± 10% UNLESS OTHERWISE STATED
R9	3900Ω	½	73032	BTS-3900	Antenna Coil Shunt
R10	47KΩ 20%	½	73045	BTS-47K	AGC Filter
R11	10KΩ	½	73037		RF Coil Shunt
R12	2200Ω 20%	½		BTS-2200	RF Amp. Decoup
R13	4700Ω	½	73033	BTS-4700	Mixer Grid
R14	220KΩ 20%	½			Mixer Grid
R15	15KΩ 20%	½			Mixer Plate
R16	10KΩ	½	73037		Osc. Grid
R17	4700Ω	½	73033	BTS-4700	Osc. Plate
R18	8200Ω	½	73036		1st Video IF Amp. Grid
R19	82Ω	½	73012	BTS-82	1st Video IF Amp. Cathode
R20	100Ω	½	73013	BTS-100	1st Video IF Amp. Decoup
R21	8200Ω	½	73036		2nd Video IF Amp. Grid
R22	82Ω	½	73012	BTS-82	2nd Video IF Amp. Cathode
R23	100Ω	½	73013	BTS-100	Decoupling
R24	100Ω	½	73013	BTS-100	AGC Network
R25	4700Ω	½	73033	BTS-4700	3rd Video IF Amp. Grid
R26	82Ω	½	73012	BTS-82	3rd Video IF Amp. Cathode
R27	100Ω	½	73013	BTS-100	Decoup
R28	100Ω	½	73013	BTS-100	AGC Network
R29	180Ω	½	73016	BTS-180	4th Video IF Amp. Cathode
R30	8200Ω	½	73036		4th Video IF Transformer Shunt
R31	3900Ω	½	73032	BTS-3900	Video Det. Diode Load
R32	100KΩ 20%	½	73149	BTS-100K	AGC Rectifier Diode Load
R33	2.2Meg 20%	½	73165	BTS-2.2Meg	AGC Network
R34	2700Ω	½	73030	BTS-2700	Voltage Divider
R35	47KΩ	½	73045	BTS-47K	Voltage Divider
R36	2700Ω	½	73030	BTS-2700	AGC Rectifier Diode Plate
R37	680Ω	2		BTB-680	Voltage Divider - See Note 1
R38	470KΩ 20%	½	73157	BTS-470K	Video Amp. Grid
R39	3300Ω	½	73031	BTS-3300	Video Amp. Plate
R40	6800Ω	½	73035	BTS-6800	Video Amp. Plate Decoup
R41	1Meg 20%	½	73161	BTS-1Meg	Bias Network
R42	680KΩ	½	73159	BTS-680K	Video Output Grid
R43	330Ω	½	73019	BTS-330	Video Output Cathode

RESISTORS (CONT.)

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PACKARD-BELL PART No.	REPLACEMENT DATA: IRC PART No.	IDENTIFICATION CODES
R44	3300Ω	1	73231	BTA-3300	Video Output Plate
R45	10KΩ	½	73037	BTS-10K	Isolation
R46	470KΩ 20%	½	73157	BTS-470K	DC Restorer Diode Load
R47	470KΩ 20%	½	73157	BTS-470K	DC Restorer Diode Load
R48	47KΩ	½	73045	BTS-47K	Voltage Divider
R49	150KΩ 20%	½	73151	BTS-150K	Voltage Divider
R50	100KΩ 20%	½	73149	BTS-100K	Picture Tube Grid
R51	150KΩ	½	73151	BTS-150K	ACC Anode Load - See Note 2
R52	82Ω	½	73012	BTS-82	1st Sound IF Amp. Cathode
R53	1000Ω	½	73025	BTS-1000	1st Sound IF Amp. Decoup
R54	120Ω 5%	½	73014	BTS-120-5%	2nd Sound IF Amp. Cathode
R55	1000Ω	½	73025	BTS-1000	2nd Sound IF Amp. Decoup
R56	470Ω	½	73021	BTS-470	Balancing
R57	22KΩ	½	73041	BTS-22K	De-emphasis
R58	10KΩ	½	73037	BTS-10K	Ratio Det. Diode Load
R59	10KΩ	½	73037	BTS-10K	Ratio Det. Diode Load
R60	4.7Meg 20%	½	73169	BTS-4.7Meg	AF Amp. Grid
R61	2.2Meg 20%	½	73165	BTS-2.2Meg	AF Amp. Screen
R62	470KΩ	½	73157	BTS-470K	AF Amp. Plate
R63	470KΩ 20%	½	73157	BTS-470K	Output Grid
R64	560Ω	1	73222	BTA-560	Output Cathode
R65	1000Ω	2	73425	BTB-1000	Decoup
R66	2.2Meg 20%	½	73165	BTS-2.2Meg	Bias Network
R67	1Meg 20%	½	73161	BTS-1Meg	Sync. Sep. Grid
R68	15KΩ	2	73439	BTB-15K	Sync. Sep. Plate
R69	1Meg 20%	½	73161	BTS-1Meg	Sync Amp. Grid
R70	6800Ω	½	73035	BTS-6800	Sync. Amp. Cathode
R71A	22KΩ	½	* 23951		Integrator
B	8200Ω	½			Integrator
C	8200Ω	½			Integrator
R72	1Meg 20%	½	73161	BTS-1Meg	Vert. Osc. Grid
R73	220KΩ 20%	½	73153	BTS-220K	Vert. Osc. Plate
R74	8200Ω	½	73036	BTS-8200	Isolation
R75	2.2Meg 20%	½	73165	BTS-2.2Meg	Vert. Output Grid
R76	1200Ω	½	73026	BTS-1200	Vert. Output Cathode
R77	1500Ω 5%	1	73227-1	BTA-1500-5%	Vert. Output Plate
R78	2.7Meg	½	73068	BTS-2.7Meg	Voltage Divider
R79	820KΩ	½	73060	BTS-820K	Horiz. AFC Grid
R80	150KΩ 20%	½	73151	BTS-150K	Horiz. AFC Cathode
R81	150KΩ 20%	½	73151	BTS-150K	Horiz. AFC Cathode
R82	68KΩ	½	73047	BTS-68K	Voltage Divider
R83	8200Ω	½	73036	BTS-8200	Horiz. AFC Filter
R84	100KΩ 20%	½	73149	BTS-100K	Horiz. Osc. Grid
R85	8200Ω	½	73036	BTS-8200	Horiz. Osc. Transformer Shunt
R86	22KΩ	1		BTA-22K	Horiz. Osc. Transformer Shunt
R87	120KΩ	1	73250	BTA-120K	Horiz. AFC Plate
R88	120KΩ	1	73250	BTA-120K	Horiz. Osc. Plate
R89	10KΩ	½	73037	BTS-10K	Decoup
R90	150KΩ 20%	½	73151	BTS-150K	Horiz. Feedback Network
R91	56KΩ	1	73246	BTA-56K	Horiz. Feedback Network
R92	560KΩ	½	73058	BTS-560K	Horiz. Feedback Network
R93	47Ω	½	73069		Parasitic Supp
R94	1Meg 20%	½	73161	BTS-1Meg	Horiz. Output Grid
R95	200Ω	5	73610	1 3/4A-200	Horiz. Output Cathode - Wire Wound
R96	18KΩ	10	73644	1 3/4A-18K	Horiz. Output Screen - Wire Wound
R97	56KΩ	½	73046	BTS-56K	Decoup
R98	3.3Ω	1	73279		HV Rectifier Filament
R99	3.3Ω	1	73290		HV Rectifier Filament
R100	10Ω	½	73001	BW-½-10	Centering Network - See Note 3
R101	1Meg	1	73261	"	HV Rectifier Load
R102	1Meg	1	73261		HV Rectifier Load
R103	1Meg 20%	1	73398		HV Filter
R104	680Ω	2		BTB-680	* Focus Coil Shunt - See Note 4
R105A	250Ω	20	73681		Voltage Divider - Wire Wound
B	1360Ω	25			Voltage Divider - Wire Wound
R106A	93Ω	5	73664		Voltage Divider - Wire Wound
B	12Ω	1			Voltage Divider - Wire Wound
C	6750Ω	5			Voltage Divider - Wire Wound
R107	500Ω	10		1 3/4A-500	Voltage Divider - Wire Wound -See Note 1
R108	330KΩ 20%	½	73155	BTS-330K	Isolation
R109	10KΩ	25		2 1/2DA-10K	Decoup - Wire Wound - See Note 1

Note 1. Not used in all models.
Note 2. Some models use 10KΩ resistor in this application.
Note 3. Some models use parallel resistors to obtain desired value.
Note 4. Later productions use 1500Ω 2 watt part # 73427 in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: PACKARD BELL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.
T1	117VAC @ 2.44A	780VCT .320ADC	5V @ 6A	6.3V @ 1.2A SEC. 4 12.6V @ 5.0A	89033		P-3166 ②	

② Add series resistor to reduce voltage.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: PACKARD BELL PART No.	REPLACEMENT DATA: STANCOR PART No.	REPLACEMENT DATA: MERIT PART No.	REPLACEMENT DATA: CHICAGO PART No.	NOTES
T2	230Ω	1350Ω	89031	A-8111 ①	A-3000 ①	TBO-1 ①	Vert. Oscillator
T3	130Ω	14Ω	89424	A-8119 ①	HVO-5	TFB-4	Horiz. Output
	tapped @ 105Ω	Tap @ 1.2Ω					
T4	920Ω	12Ω	89422	A-8112 ①	A-3038	TSO-5 ①	Vert. Output
T5A	13Ω		29501	DY-7	MD-70F	TFB-4	Horiz. Deflection Coil
B	62Ω						Vert. Deflection Coil
T6	465Ω		29519		MF-2		Focus Coil

① Drill one new mounting hole.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		Packard Bell PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T7	7.1KΩ	3.4Ω	510Ω	.6Ω	89426	A-3878 ①	A-3020 ①	RO-13 ①	①Drill one new mtg. hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			NOTES
	FIELD RES.	V. C. IMP.	Packard Bell PART No.	VIKING PART No.	QUAM PART No.	
SP1	PM	3.4Ω	83705	10J12	10A4	
	CONE DIA.	V. C. DIA.				
SP2	9 3/4"	3/4"				

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				INSTALLATION NOTES
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	Packard Bell PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
L1	.310A	37Ω	1.8 Henries	27005	C-2326 ①		TR-3300①	① Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	Packard Bell PART No.	MEISSNER PART No.	
L2	Ant. Coil	0Ω	0Ω	*		
L3	RF Mixer Grid and Osc. Coils	0Ω		*		
L4	Fil. Choke	0Ω		*		
L5	Fil. Choke	0Ω		*		
L6	1st Video IF	.6Ω		*		
L7	IF Trap	.6Ω		*		
L8	1st Video IF Coupling	1Ω		29523		Wound on 3.3KΩ resistor
L9	2nd Video IF	.5Ω		29028		
L10	3rd Video IF	.3Ω	0Ω	29047		Includes sound take off coil
L11	RF Choke	6Ω		29115		55 Microhenries
L12	4th Video IF	.5Ω		29028		
L13	Cathode Trap	.1Ω	.1Ω	29516		
L14	RF Choke	6Ω		29115		55 Microhenries
L15	5th Video IF	.5Ω		29028		
L16	Peaking	9Ω		29508	19-1921 #	180 Microhenries wound on 39KΩ resistor white dot
L17	Peaking	12Ω		29509	19-1922	250 Microhneries green dot
L18	Peaking	7.8Ω		29506	19-1921 ▲	120 Microhenries wound on 22KΩ resistor blue dot
L19	Peaking	6.5Ω		29507	19-1920	93 Microhenries red dot
L20	Peaking	7.8Ω		29506	19-1921 ▲	120 Microhenries wound on 22KΩ resistor blue dot
L21	Peaking	6.5Ω		29507	19-1920	93 Microhenries red dot
L22	Sound IF	.2Ω	.2Ω	29025		
L23	Ratio Det. Trans.	.2Ω	.1Ω	29031		
L24	Horiz. Osc. Trans	80Ω	45Ω	29048		
L25	Horiz. Lin.	8.5Ω		29517		Tap at 3.2Ω

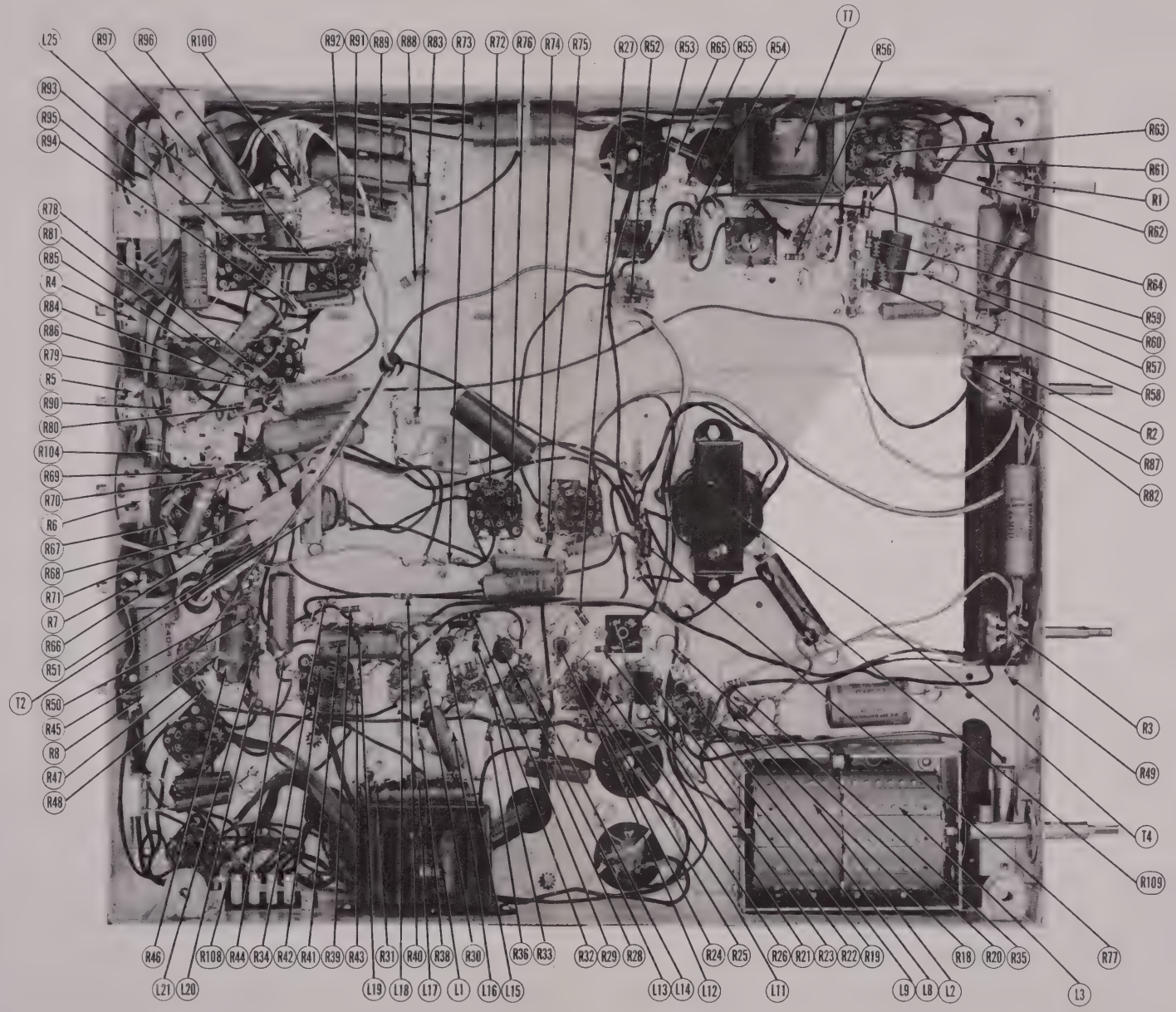
* Part of tuner part #10528
\# Parallel with 39KΩ resistor
▲ Parallel with 22KΩ resistor

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					Packard Bell PART No.		
M1	Bayonet	6-8	25	Blue	79074		Type #44

MISCELLANEOUS

ITEM No.	PART NAME	PACKARD BELL PART No.	NOTES
M2	RF Tuner	10528	
M3	Fuse	45004	
M4	Switch	86701	Horizontal size
M5	Ion Trap	28032	
B1, B2	Trimmer	23417	Dual horizontal lock 10-160MMF, horizontal frequency 40-370MMF
	Safety Glass	55017B	Model 2601
	Safety Glass	55017A	Model 2692
	Knob	52067-1	Channel selector model 2601
	Knob	52053	Channel selector model 2692
	Knob	52068	Fine tuning model 2601
	Knob	52054	Fine tuning model 2692
	Knob	52055	Volume
	Knob	52056	Small dual
	Knob	52057	Large dual



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PHILCO MODELS
51-530, 51-532, 51-534

PHILCO MODELS
51-530, 51-532, 51-534

PHILCO MODEL 51-530

TRADE NAME	Philco, Models 51-530, 51-532, 51-534
MANUFACTURER	Philco Corp., Tioga and "C" Sts., Philadelphia, Pa.
TYPE SET	AC-DC Operated Superheterodyne Receiver With Loop Antenna
TUBES (FIVE)	Types 7A8 Converter, 12BA6 IF Amp., 14B6 Det.-AVC-AF, 50L6GT Power Output, 35Z5GT Rectifier
POWER SUPPLY	105-125 Volts AC-DC RATING .26 Amp. @ 117Volts AC
TUNING RANGE—BROADCAST	540-1630KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer turn tuning gang fully open and set the pointer to the calibration mark near the right hand end of the dial backplate.
Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD.	High side to pin 6 (grid) of 7A8 (V1). Low side B-.	455KC (400 ∿ Mod.)	Tuning gang fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1630KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1500KC	Tune for max. output.	"	A6	"

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		PHILCO PART No.	STANDARD REPLACEMENT		
V1	Converter	7A8	7A8	8U	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det.-AVC-AF	14B6	14B6	8W	
V4	Power Output	50L6GT	50L6GT	7AC	
V5	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	30	150	30-2573	PRS150/30-30		EDL32V215		TVA-3448	Filter Orange
B	25	150		-30					Filter Blue
C	20	150							Filter Red
C2	.05	400	61-0122	P488-05	DF-503	PTE4S5		4TM-S5	AVC Filter
C3	47	500	60-00475417	1468-00005	D6-470	5W5Q5	GP1K-47	1FM-45	Osc. Grid Cap.
C4	.003	600	61-0109	P688-003	D6-302	PTE6D3	GP2M-003	6TM-D3	Decoupling
C5	.01	400	61-0120	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C6 A	7000		30-1239-4	P688-006	D6-682	PTE6D6	821-01	6TM-D6	Audio Coupling
B	220			S1200	D6-221	5W5T25	GP2K-220	19C13	Output Grid
C7	.05	400	61-0122	P488-05	DF-503	PTE4S5		4TM-S5	Tone Comp. *
C8	.1	400	61-0113	P488-1	DF-104	PTE4P1		72PS2	Line Isolation
C9	.04	400	45-3500-2	P688-04		PTE6S4		6TM-S4	Line Filter

* Models 51-532 and 51-534 use .02MFD in this application.

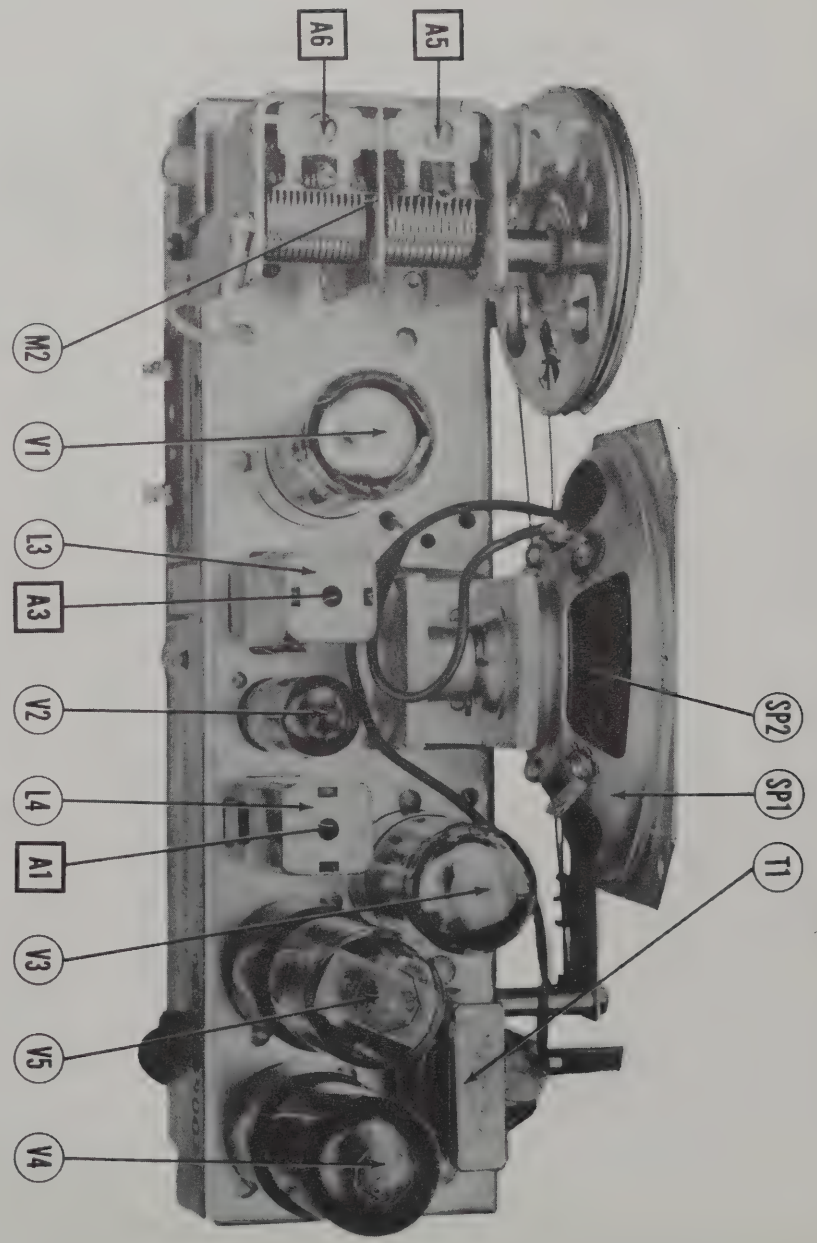
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	500KΩ	½	33-5538-7	Q13-133	AG-60-S	B-60-S	Volume control
B	Shaft		Not req.	Not req.	FS-3	Not req.	Attach to R1A per instructions
C	Switch		Not req.	76-1	SWB	Not req.	Attach to R1A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
R2	150KΩ	½	66-4158340	BTS-150K	Isolation
R3	100KΩ	½	66-4108340		Osc. Grid
R4	39KΩ	½	66-3398340	BTS-39K	Decoup
R5	2.2Meg	½	66-5228340		IF Amp. Grid
R6	68Ω	½	66-0688340	BW-½-68	IF Amp. Cathode - Wire Wound
R7	47KΩ	½	66-3478340	BTS-47K	Diode Filter
R8	2.2Meg	½	66-5228340	BTS-2.2Meg	AVC Network
R9	3.3Meg	½	66-5338340	BTS-3.3Meg	AF Amp. Grid
R10	470KΩ	½	66-4478340	BTS-470K	AF Amp. Plate
R11	470KΩ	½	66-4478340	BTS-470K	Output Grid
R12	130Ω	½	66-1138340	BTS-120	Output Cathode
R13	2200Ω	½	66-2228340	BTS-2200	Tone Compensation
R14	1200Ω	½	66-2128340	BTS-1200	Filter
R15	220Ω	1	66-1224340	BW-1-220	Filter - Wire Wound

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2500Ω	3.5Ω	200Ω	.7Ω	32-8384	A-3332	A-3025	RO-2 ①	① Drill on new mtg. hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			PHILCO PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.	36-1627-5	ST-113		② Used in model 51-534
SP1	PM	3.5Ω	36-1625-3 ②	Mod. P4-X	4A1	
	CONE DIA.	V. C. DIA.				
SP2	3 7/8 "	9/16"				

R F COILS

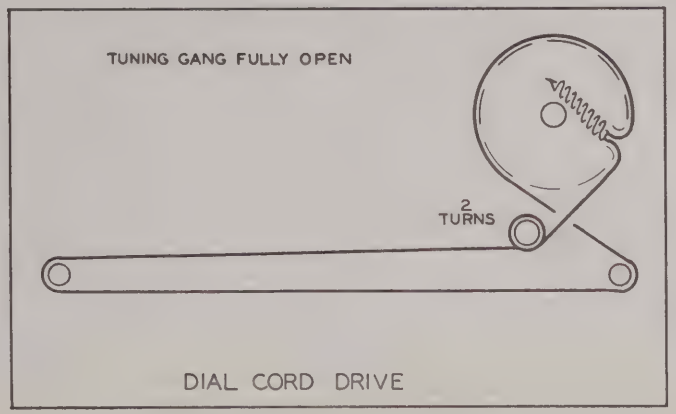
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	
L1A	Loop Antenna	.4Ω	3.2Ω	32-4052-33		Model 51-530
B	Loop Antenna			32-4052-38		Model 51-532
C	Loop Antenna			32-4052-51		Model 51-534
L2	Osc. Coil	2.7Ω	7.5Ω	32-4263		
L3	1st IF	22Ω	22Ω	32-4160-6A	16-6678	
L4	2nd IF	16Ω	16Ω	32-4240-2A		

DIAL LIGHTS

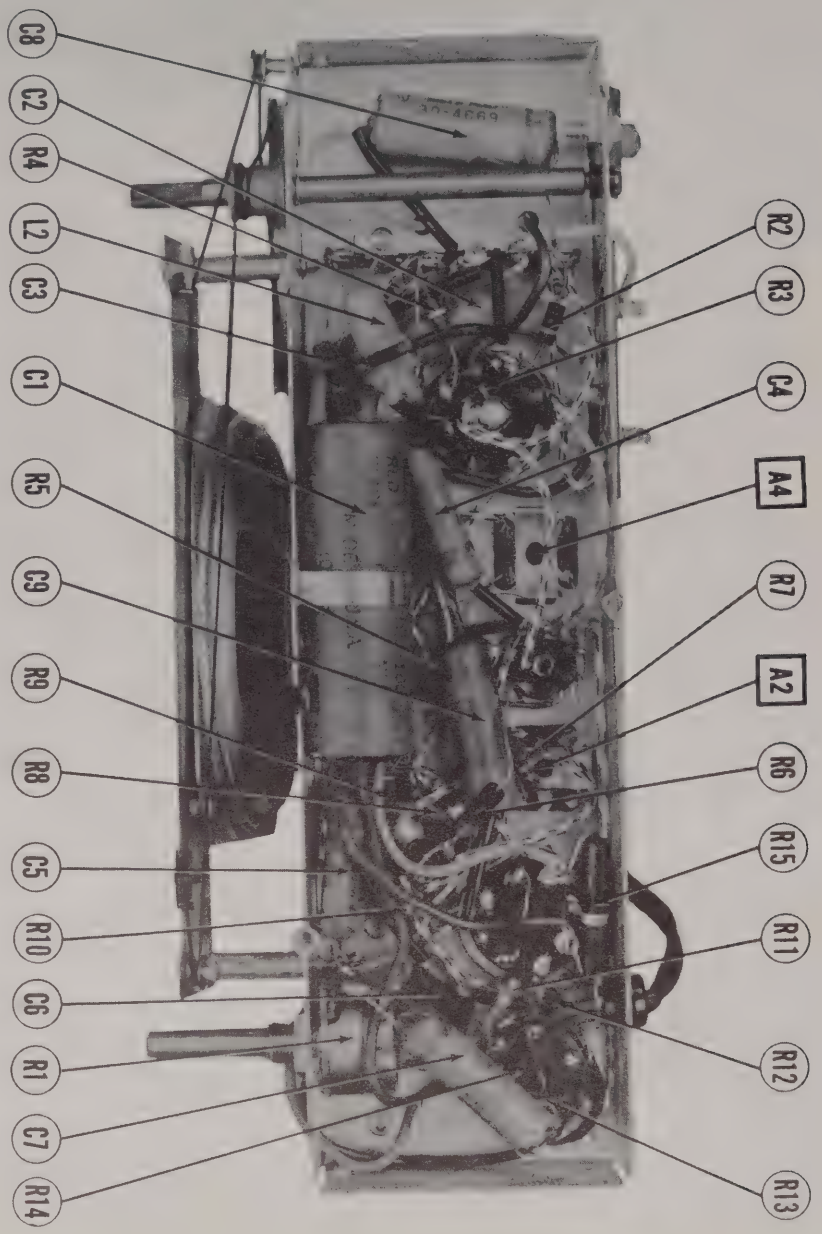
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					PHILCO PART No.		
M1	Bayonet	6-8V	.150	Brown	34-2068		Type #47 - Not Used In Model 51-530

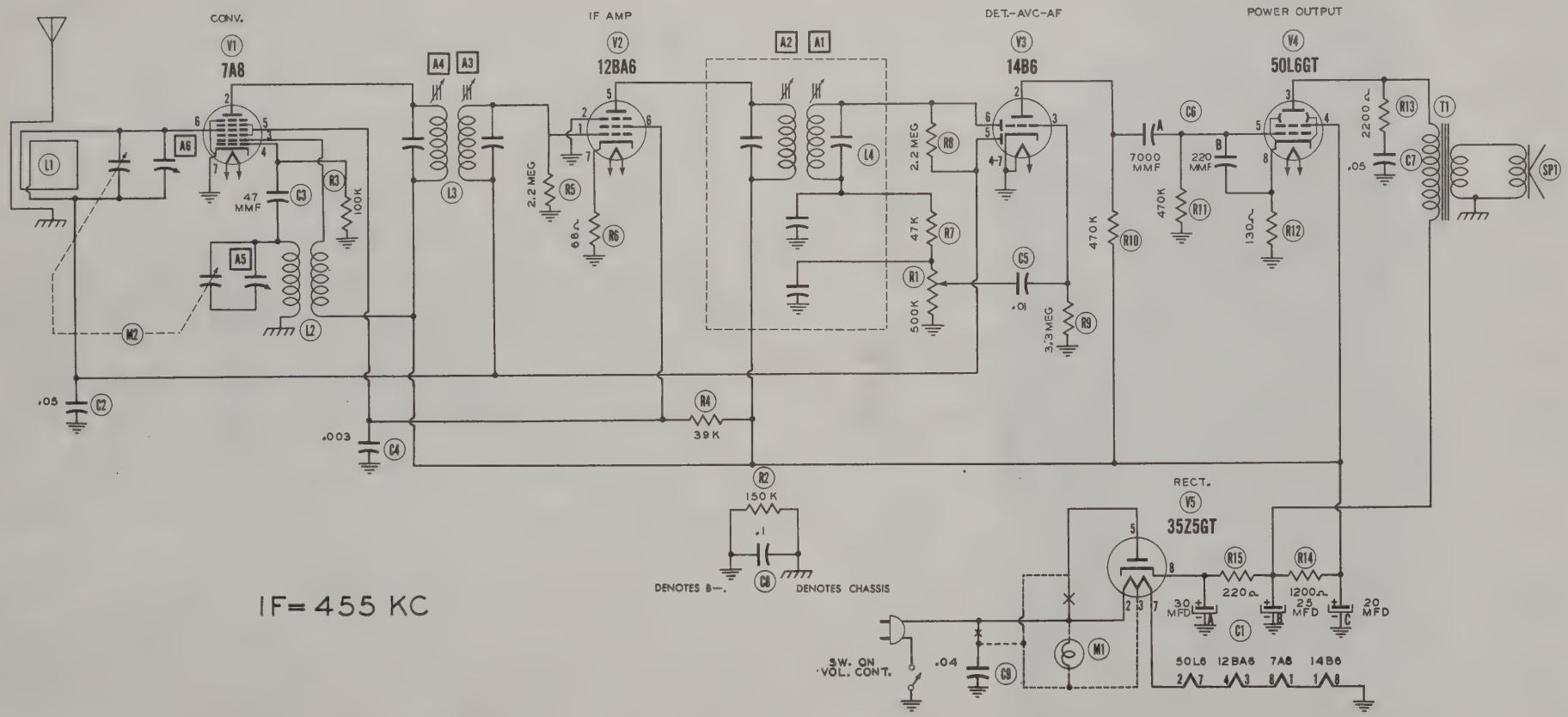
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M2	2 Gang Var. Cap	31-2751-6	(33-542MMF, 29-216MMF)
	Cabinet	10750	Model 51-530 (Mahogany)
	Cabinet	10750-1	Model 51-530 (Ivory)
	Cabinet	10769-3	Model 51-532 (Mahogany)
	Cabinet	10769-4	Model 51-532 (Ebony)
	Cabinet	10769-5	Model 51-532 (Ivory)
	Cabinet	10836	Model 51-534 (Mahogany)
	Cabinet	10836-1	Model 51-534 (Ivory)



CHASSIS—BOTTOM VIEW





IF= 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	7A8	13VAC	100VDC	100VDC	§-7.8VDC	40VDC	-.5VDC	0V	20VAC
V 2	12BA6	-.6VDC	0V	20VAC	33VAC	100VDC	40VDC	.2VDC	
V 3	14B6	13VAC	45VDC	-.4VDC	0V	-.6VDC	-.6VDC	0V	0V
V 4	50L6GT	100VDC	85VAC	100VDC	100VDC	0V	110VDC	33VAC	6.4VDC
V 5	35Z5GT	0V	117VAC	105VDC	100VDC	117VAC	110VDC	85VAC	125VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	7A8	13Ω	†1.4KΩ	†1.4KΩ	100KΩ	†40KΩ	1.3Meg	0Ω	20Ω
V 2	12BA6	1.2Meg	0Ω	20Ω	35Ω	†1.4KΩ	†40KΩ	68Ω	
V 3	14B6	13Ω	†470KΩ	3.3Meg	0Ω	1.3Meg	550KΩ	0Ω	0Ω
V 4	50L6GT	†2.4KΩ	85Ω	†420Ω	†1.4KΩ	470KΩ	†220Ω	35Ω	130Ω
V 5	35Z5GT	0Ω	120Ω	110Ω	†1.4KΩ	120Ω	†220Ω	85Ω	35KΩ

† MEASURED FROM PIN 8 OF V5

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

RCA VICTOR MODELS
9T57, 9T77, 9T79 (CH. KCS49, A, AT, T),
9T89 (CH. KCS60, A, AT, T)

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MODEL 9T89

RCA VICTOR MODELS
9T57, 9T77, 9T79 (CH. KCS49, A, AT, T),
9T89 (CH. KCS60, A, AT, T)

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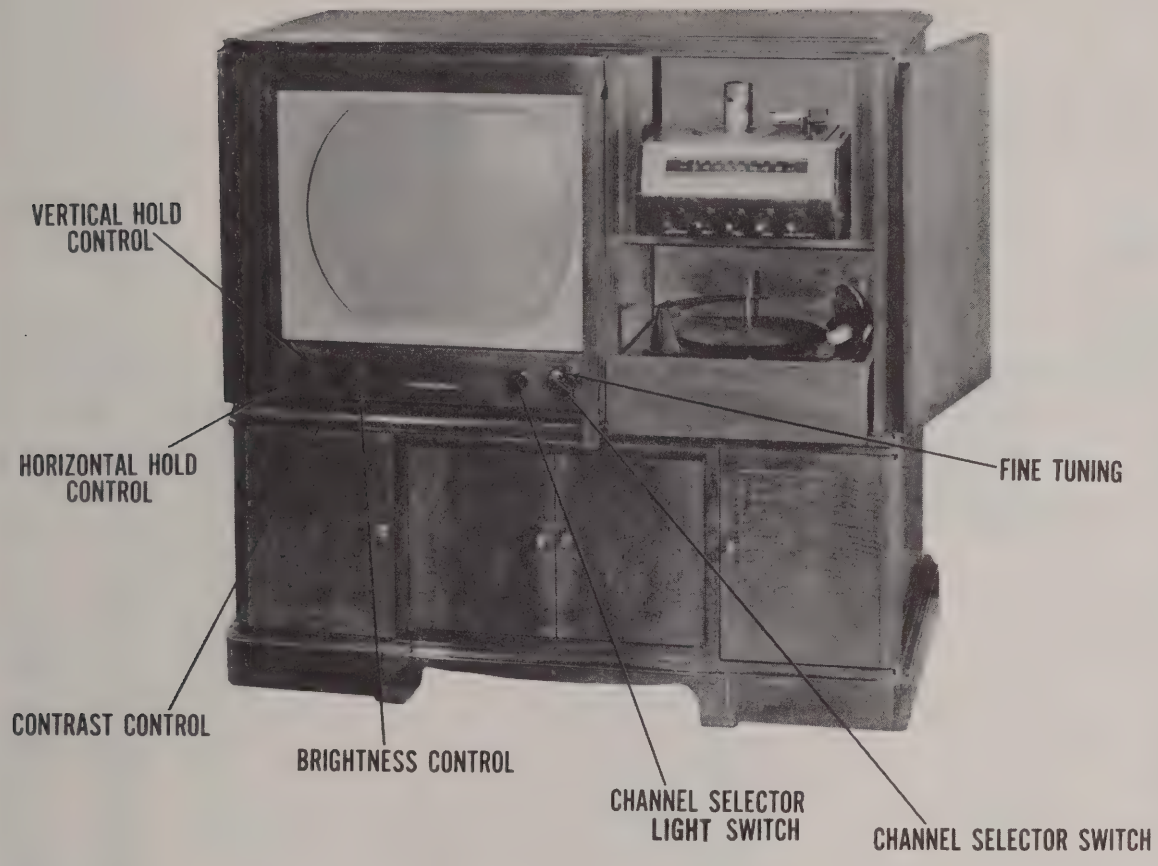

RCA VICTOR MODEL 9T89

TRADE NAME	RCA Victor Models, 9T57 (Ch. KCS49), 9T77 (Ch.KCS49T), 9T79 (Ch.KCS49A, AT), 9T89 (Ch.KCS60, T And Radio Chassis RC 1092)
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, New Jersey
TYPE SET	TV-AM-FM-Phono Combination Receiver (Ch. KCS49 TV "Only")
TUBES	Twenty-one (TV "Only" Receivers) Thirty-one (Combination Receivers)
POWER SUPPLY	110-120 Volts AC-60 Cycle
RATINGS	1.5 Amp. @ 117 Volts AC (TV) , .7 Amp. @ 117 Volts AC (Radio)
TUNING RANGE	(TV) - Channels 2 thru 13, (FM) 88-108MC, (AM) 540-1620KC

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RECORD CHANGER UNITS (33 1/3-78RPM) RCA MODEL 960284, (45RPM) RCA MODEL RP168 (PHOTOFACT SET #72-FOLDER NUMBER 10 OR RECORD CHANGER MANUAL CM-3)

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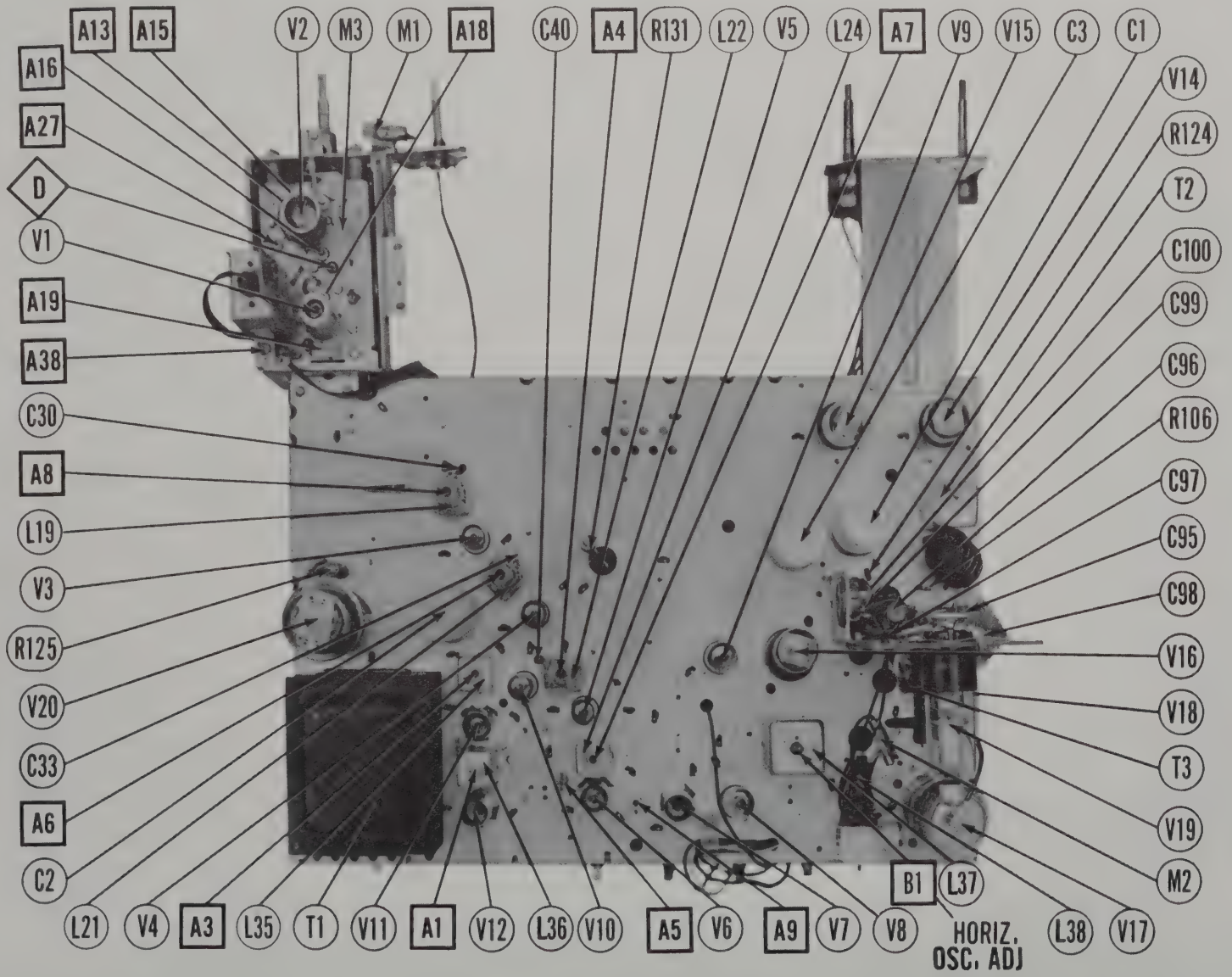
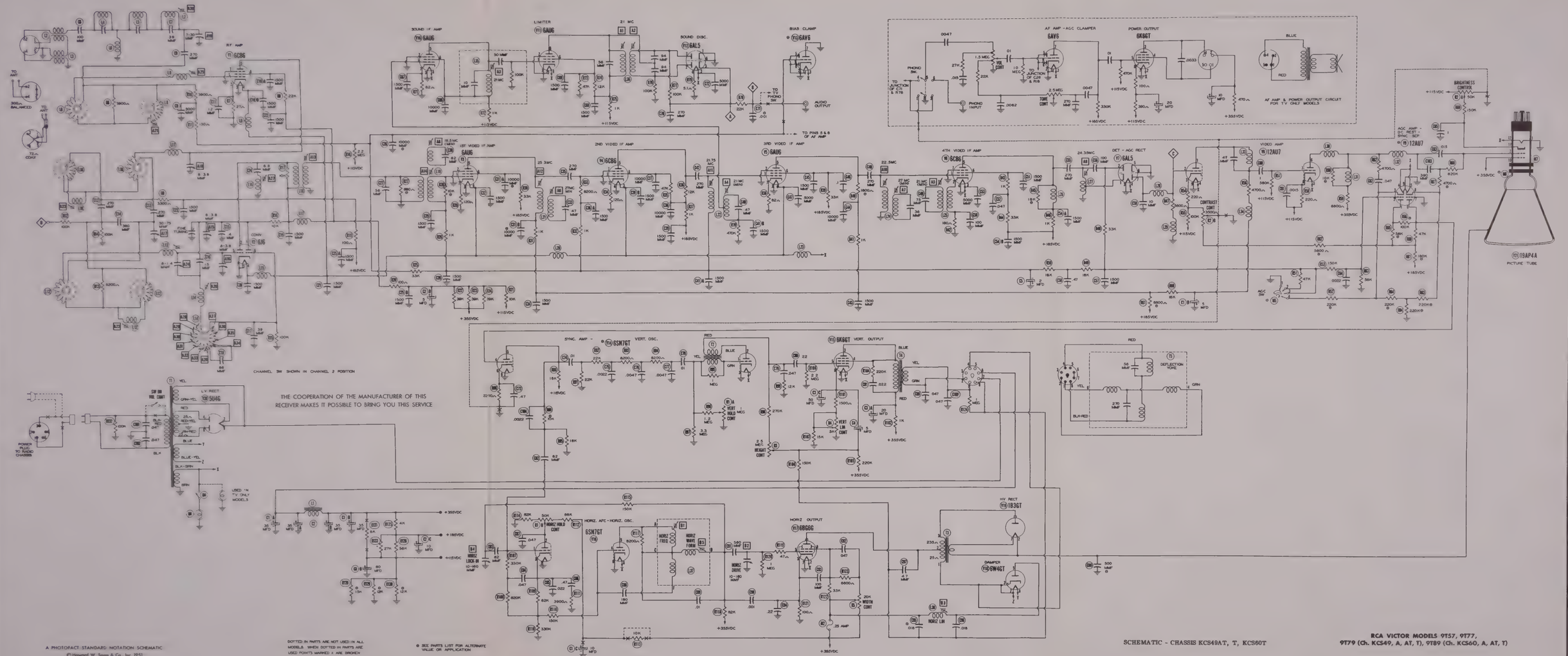


CHASSIS TOP VIEW



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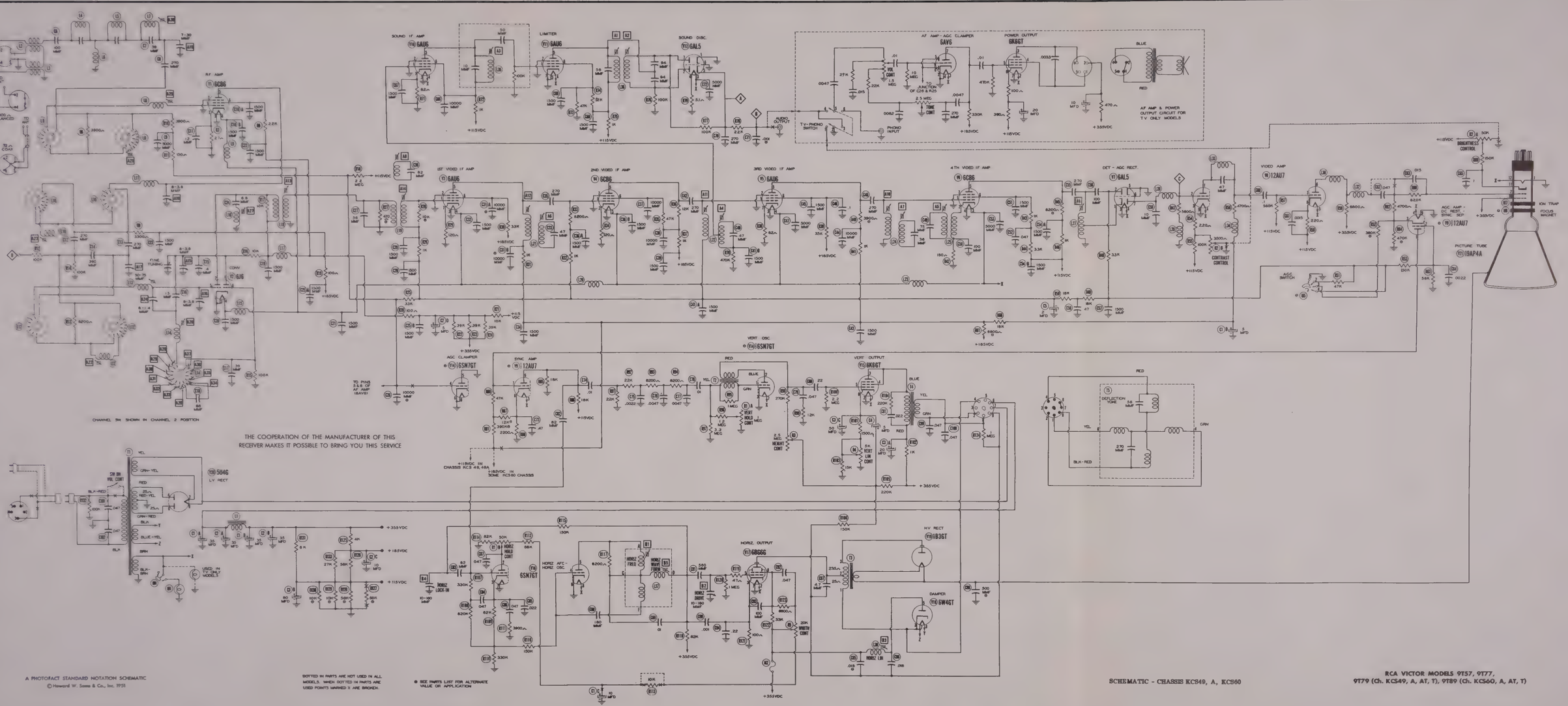
⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

SCHEMATIC - CHASSIS KCS49AT, T, KCS60T

RCA VICTOR MODELS 9T57, 9T77, 9T79 (Ch. KCS49, A, AT, T), 9T89 (Ch. KCS60, A, AT, T)

RCA VICTOR MODELS 9T57, 9T77, 9T79 (Ch. KCS49, A, AT, T), 9T89 (Ch. KCS60, A, AT, T)



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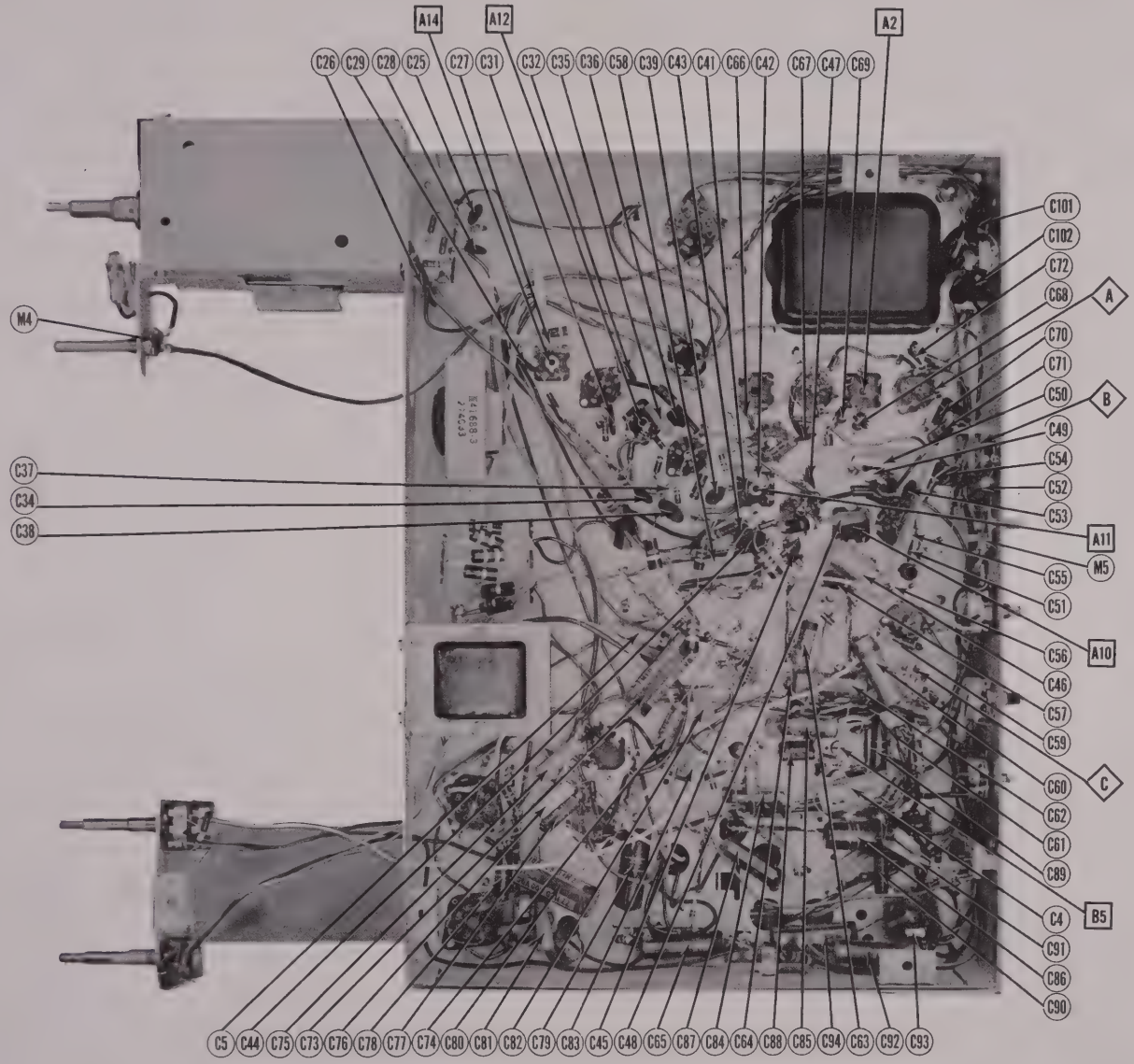
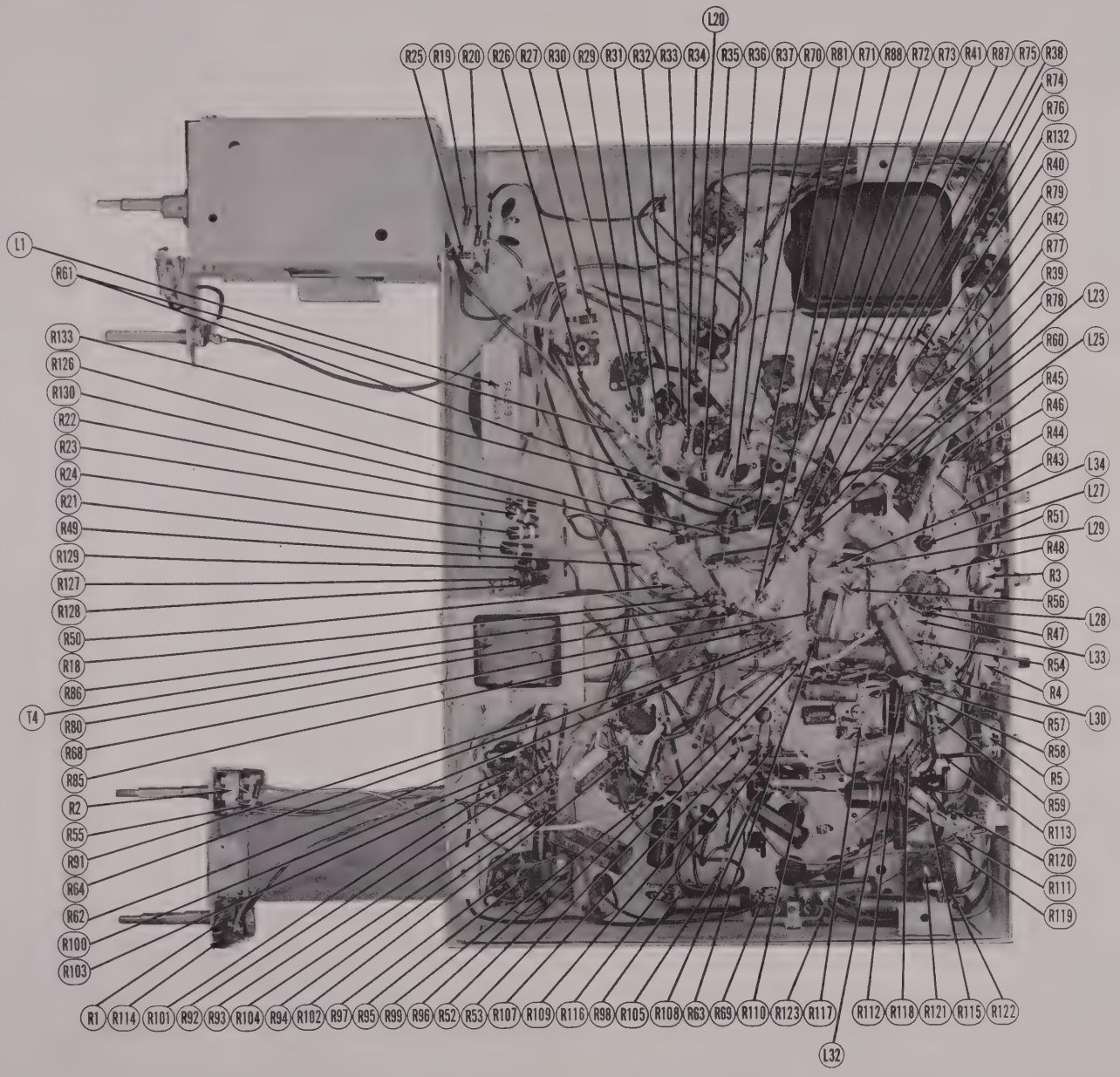
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

SCHEMATIC - CHASSIS KCS49, A, KCS60

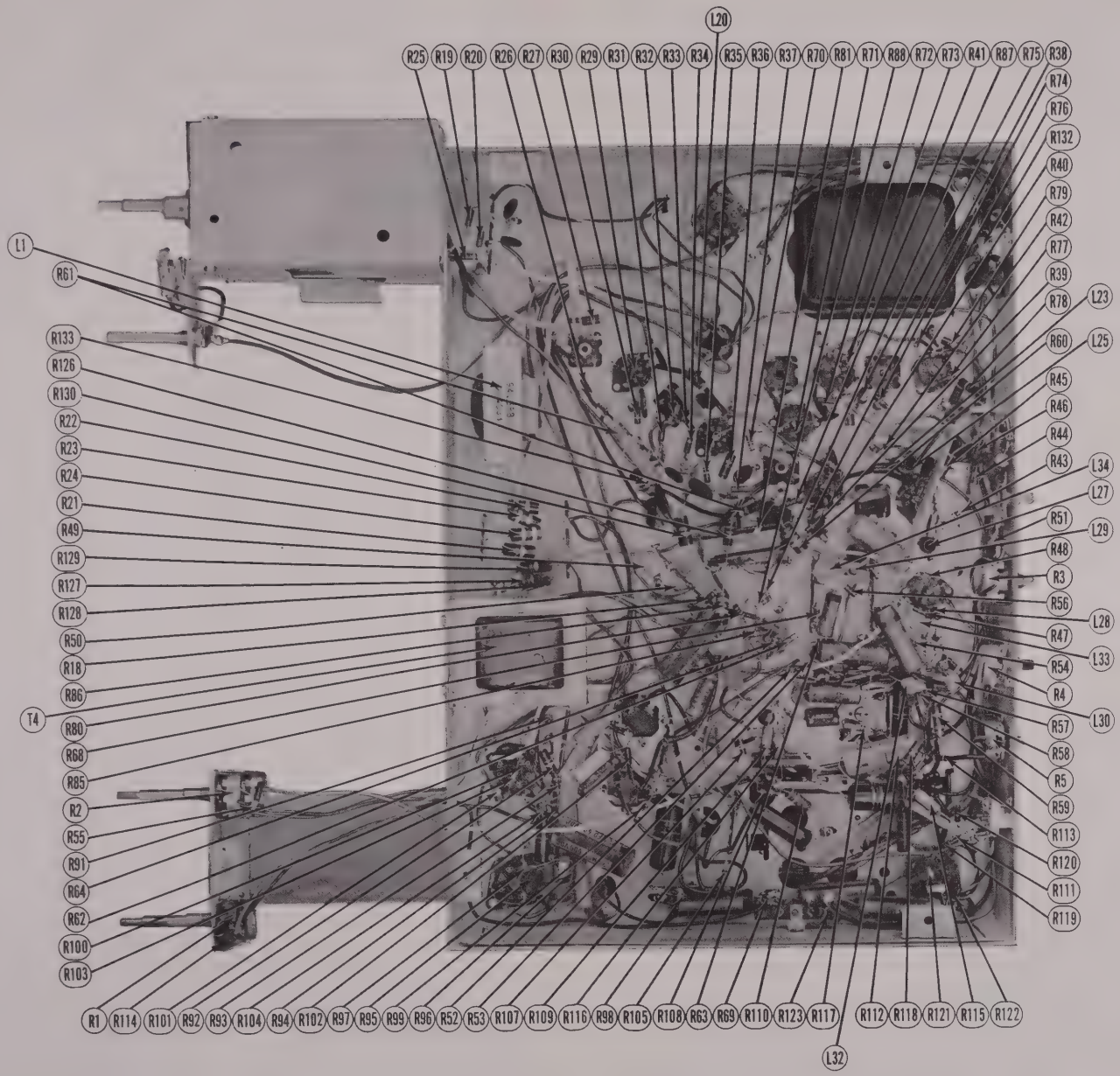
RCA VICTOR MODELS 9T57, 9T77,
9T79 (Ch. KCS49, A, AT, T), 9T89 (Ch. KCS60, A, AT, T)



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

TV ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube (V16) from its socket.
The plug on the focus and deflection assembly must be in place to operate the set.
Remove the converter tube (V2) and replace it with a 6J6 which has pin 1 removed. This will disable the local oscillator and prevent erroneous indications.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V11). Low side to chassis.	21MC (Unmod.)	Any	DC Probe thru 1 Meg. to Point (A). Common to chassis.	A1	Detune A2 to maximum counter clockwise. Adjust A1 for maximum deflection.
2.	.001MFD	"	"	"	DC Probe to Point (B). Common to chassis.	A2	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
3.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	"	"	DC Probe thru 1 Meg. to Point (A). Common to chassis.	A3	Adjust for maximum deflection.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	21MC (450KC SWP)	21MC	Any	Vert. Amp. to Point (A). Low side to chassis.	A1, A3	Adjust for maximum amplitude and symmetry as per figure 1.
2.	.001MFD	"	"	"	"	Vert. Amp. to Point (B). Low side to chassis.	A2	Adjust A2 so 21MC occurs at center of crossover lines as per figure 2. SLIGHTLY retouch A1 for maximum amplitude and straightness of crossover lines. Continue with step 4.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt battery to the junction of R25 and R26, connect the positive lead to chassis.
* NOTE: In later productions, receivers where R40 is 1800Ω, R45 is 18KΩ and L26 has been added, the frequencies to which A9 and A10 are tuned have been reversed. In those receivers, A9 is tuned to 24.35MC, and A10 is tuned to 22.5MC.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	Not used	21MC	Any	Use VTVM DC Probe to Point (C). Common to chassis.	A4, A5	Adjust for MINIMUM deflection.
5.	Direct	"	"	27MC	"	"	A6, A7	"
6.	Direct	"	"	19.5MC	"	"	A8	"
7.	Direct	"	"	* 22.5MC	"	"	A9	Adjust for maximum deflection. See note above.
8.	Direct	"	"	* 24.35MC	"	"	A10	"
9.	Direct	"	"	21.75MC	"	"	A11	"
10.	Direct	"	"	25.3MC	"	"	A12	"
11.	Direct	"	24MC (10MC SWP)	22.3MC	"	Vert. Amp. to Point (C). Low side to chassis.	A13, A14	Connect 330Ω carbon resistors across R33, R36, R40 and R45. Adjust A13 and A14 for response curve similar to figure 3. Remove all 330Ω resistors.
12.	Direct	"	"	21.85MC 24.75MC 25.5MC 26.25MC	"	"		Check for response curve similar to figure 4. If necessary retouch A9 thru A14 for proper response.

FIG. 1

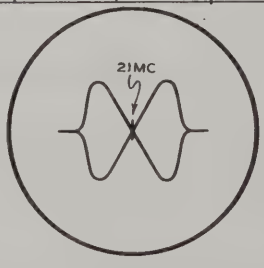


FIG. 2

FIG. 3

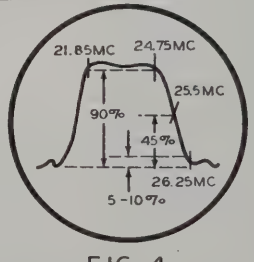


FIG. 4

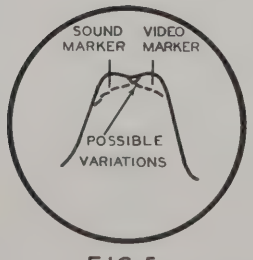


FIG. 5

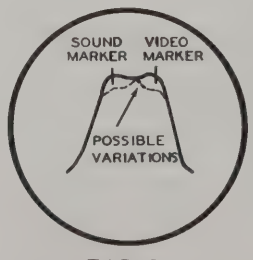
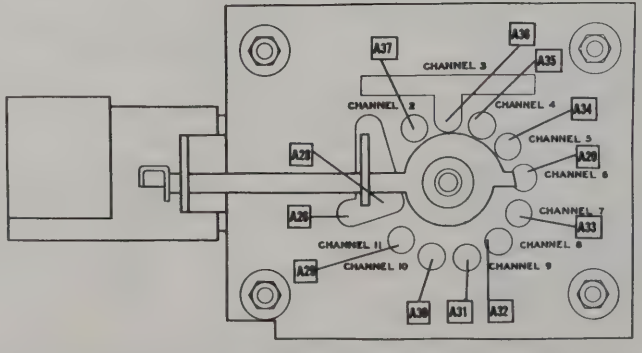


FIG. 6



RF OSCILLATOR ADJUSTMENTS

TV ALIGNMENT INSTRUCTIONS (CONT.)

RF TUNER ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
Disconnect the co-ax link from terminal 2 of the tuner terminal board and connect a 39Ω carbon resistor across terminals 1 and 2.
Loosely couple the link to terminal 2 of the terminal board.
Connect the negative lead of the 3 volt battery to terminal 3 of the terminal strip, connect the positive lead to chassis.
The sweep generator output lead should be terminated iwith its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE OR VTVM	ADJUST	REMARKS
13.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	Not used	215.75MC	13	VTVM DC Probe to Point (B) Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
14.	"	"	183MC (10MC SWP)	181.25MC 185.75MC	8	SCOPE Vert. Amp. to Point (D). Low side to chassis.	A16, A17, A18, A19	Adjust for response curve with bandwidth shown in figure 5.
15.	"	"	Not used	87.75MC	6	VTVM DC Probe to Point (B) Common to chassis.	A20	Adjust as in step 13.
16.	"	"	85MC (10MC SWP)	83.25MC 87.75MC	6	SCOPE Vert. Amp. to Point (D). Low side to chassis.	A21, A22, A23	Adjust for response similar to figure 6.
17.	Connect VTVM to Point D and adjust A24 for -3 volt reading. If necessary slightly retouch A21, A22, A23 and A17 for proper response on channel 6. Repeat these retouching adjustments until proper response is obtained with -3 volt reading at Point D .							
18.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	Not used	185.75MC	8	VTVM DC Probe to Point (B) Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
19.	"	"	183MC (10MC SWP)	181.25MC 185.75MC	8	SCOPE Vert. Amp. to Point (D). Low side to chassis.		Readjust A16, A17, and A19 for response curve, frequency and bandwidth shown in figure 5.
20.	"	"	213MC (10MC SWP)	211.25MC 215.75MC	13	"	A25	Adjust for maximum amplitude of response midway between the markers. Then overshoot the adjustment of turning the slug in the same direction a little more than required for maximum amplitude from the initial setting. Adjust A19 for maximum amplitude.
21.	"	"	Not used	215.75MC	13	VTVM DC Probe to Point (B) Common to chassis.	A26	Adjust for zero reading as in step 18. Then overshoot the adjustment as in step 20. Adjust A15 to reset the oscillator to the proper frequency.
22.	"	"	213MC (10MC SWP)	211.25MC 215.75MC	13	SCOPE Vert. Amp. to Point (D). Low side to chassis.		Check all high band channels for proper response with markers above 80%. If markers do not appear within 80% repeat step 14. If A19 is adjusted, the adjustment should be over shot a small amount and compensated for by adjusting A25 for maximum amplitude between the sound and video markers. If the valley in the top of the curves on the high channels seems deeper than normal adjust A27 to flatten the curve. In later productions A27 may be fixed and will not require adjustment.
			207MC (10MC SWP)	205.25MC 209.75MC	12			
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
23.	Check the oscillator frequency for the high band channels. If the oscillator is off frequency, overshoot the adjustment of A15 and compensate for it by adjusting A26 for zero voltage at Point B .							
24.	Repeat step 15.							
25.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	85MC (10MC SWP)	83.25MC 87.75MC	6	SCOPE Vert. Amp. to Point (D). Low side to chassis.		Check for response curve similar to figure 6. If necessary retouch A21, A22, and A23 for proper response.
26.	Check the voltage at Point D . If necessary adjust A24 for -3 volt reading. If A24 is adjusted, turn channel selector to channel 8 and readjust A16 for proper response.							
27.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	85MC (10MC SWP)	83.25MC 87.75MC	6	SCOPE Vert. Amp. to Point (D) Low side to chassis.		Check all low band channels for response similar to figure 6, and the injection voltage at Point D which should be -3 volts. Also recheck channels 7 thru 13.
28.	"	"	Not used	215.75MC	13	VTVM DC Probe to Point (B) Common to chassis.		If necessary adjust A15 for zero voltage as in step 13.
29.	"	"	"	209.75MC	12	"	A28	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
				203.75MC	11		A29	
				197.75MC	10		A30	
				191.75MC	9		A31	
				185.75MC	8		A32	
				179.75MC	7		A33	
				87.75MC	6		A20	
				81.75MC	5		A34	
				71.75MC	4		A35	
				65.75MC	3		A36	
				59.75MC	2		A37	
30.	Turn channel switch to channel 8 and adjust A24 for proper response. When A24 is properly adjusted the curve will be slightly wider with a slightly deeper valley at the top. Check all channel for: (1) proper response, (2) oscillator injection voltage at Point D, and (3) oscillator frequency. Make slight touch up adjustments, if necessary. If A16 and A24 are changed considerably, retouch the oscillator frequency on all channels.							
31.	Disconnect the 39Ω resistor from terminals 1 and 2 on the terminal strip and reconnect the co-ax link. Repeat steps 11 and 12 of Video IF Alignment.							

RADIO ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Remove the plastic radio cover containing the dial scale and 45RPM record player.
Turn the tuning gang fully closed. Set the dial pointer to the calibration mark near the left hand end of the dial backplate.
Replace the plastic cover.

AM ALIGNMENT

Any adjusting done on the 455KC IF's will necessitate alignment of the 10.7MC FM IF's.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Alternate loading of the IF transformers is used.
Connect 47KΩ resistor across the primary of each transformer while the secondary of the same transformer is being adjusted.
During secondary adjustment move the 47KΩ resistor to across the primary.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
32.	.1MFD	High side to stator on center "AM" section of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	AM (third position CW)	Tuning gang fully closed	Across voice coil	A39, A40, A41, A42	Adjust in the order given for maximum output. Then adjust in reverse order using alternate loading as described above.
33.		Loop	1620KC	"	Tuning gang fully open	"	A43	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
34.		Loop	1400KC	"	Tune for max. output.	"	A44, A45	"
35.		Loop	600KC	"	600KC	"	A46, A47	Connect a 10KΩ resistor across the center "AM" section of tuning gang. Rock tuning gang while adjusting A46 for maximum output. Remove 10KΩ resistor and adjust A47 while rocking tuning gang. Repeat steps 34 and 35 until no further improvement can be made.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from point E to chassis. The junction of these two resistors is alignment point G as shown on the schematic.
Alternate loading is used on all FM transformers except the discriminator transformer L36. Connect a 680 ohm resistor across the primary of each transformer while the secondary of the same transformer is being adjusting. During primary adjustment move the 680 ohm resistor to across the secondary.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
36.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V24). Low side to chassis.	10.7MC (Unmod.)	FM (fourth position CW)	Tuning gang fully open	DC Probe to to Point (E). Common to chassis.	A48	Adjust for maximum deflection.
37.	.01MFD	"	"	"	"	DC Probe to Point F. Common to Point (G).	A49	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
38.	470Ω carbon res.	High side to stator on center of "FM" section of tuning gang. Low side to chassis.	"	"	"	DC Probe to Point (E). Common to chassis.	A50, A51, A52, A53	Adjust for maximum deflection. Use alternate loading as described above.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
36.	.01MFD	High side to pin 1 (Grid) of 6BA6 (V24). Low side to chassis.	10.7MC (450KC SWP)	FM (fourth position CW)	Point of non-interference	Vert. Amp. to Point (E). Low side to chassis.	A48, A50, A51	Disconnect stabilizer capacitor C106. Adjust for maximum amplitude and symmetry as per figure 7.
37.	.01MFD	High side to pin 5 (Grid) of 6J6 (V23). Low side to chassis.	"	"	"	"	A52, A53	"
38.	.01MFD	"	"	"	"	Vert. Amp. to Point (F). Low side to chassis.	A49	Reconnect capacitor C106. Adjust A49 so 10.7MC occurs at center of crossover lines as per figure 8. SLIGHTLY retouch A48 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
39.	Two 120Ω carbon res.	Across FM antenna terminals with 120Ω in each lead.	90MC (Unmod.)	FM	90MC	DC Probe to Point (E). Common to chassis.	A54	Expand or compress coil turns for maximum deflection.
40.	"	"	106MC	"	Tune for max. deflection.	"	A55, A56	Adjust for maximum deflection.
41.	"	"	90MC	"	"	"	A57, A58	Expand or compress coil turns for maximum deflection.

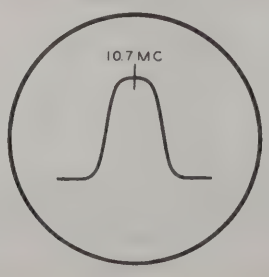


FIG. 7

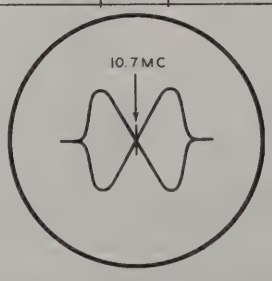
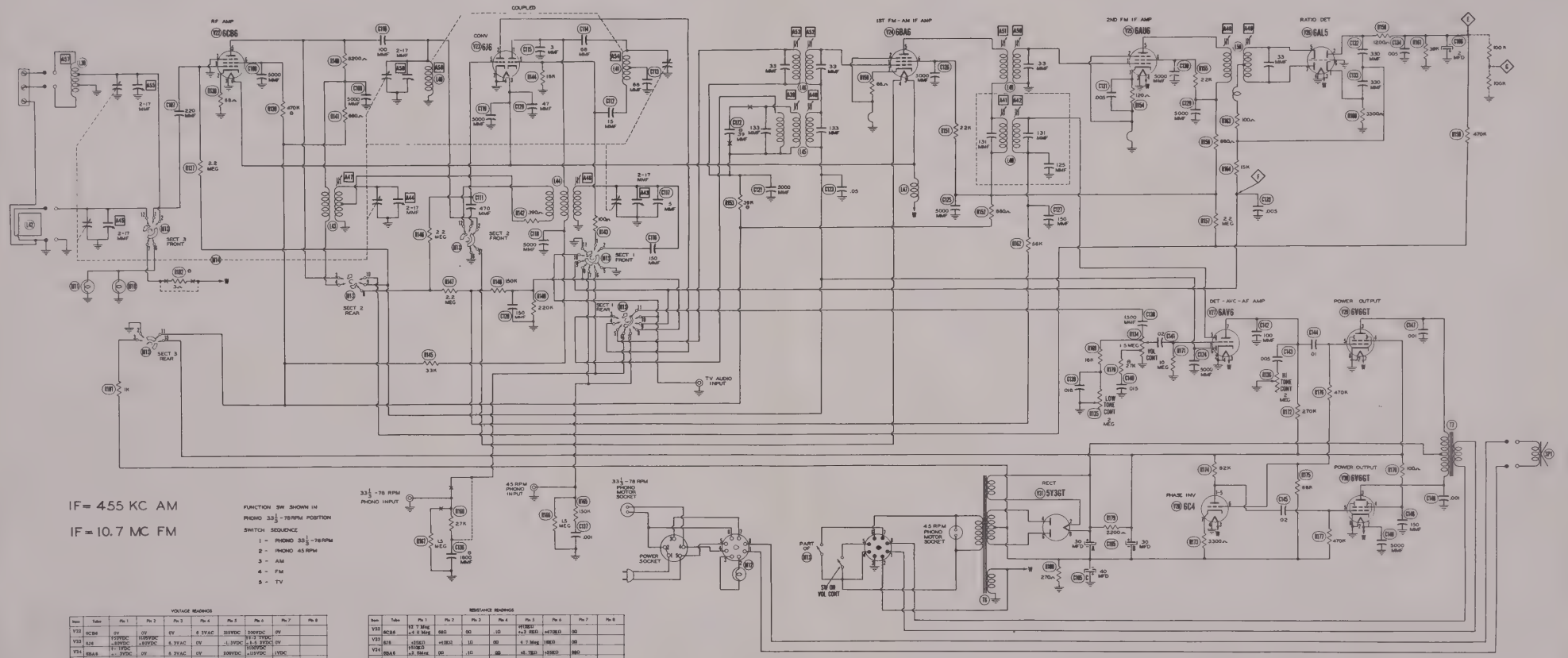


FIG. 8


RF AMP V22 6CB6
CONV V23 6J6
1ST FM - AM IF AMP V24 6BA6
2ND FM IF AMP V25 6AU6
RATIO DET V26 6AL5
DET - AVC - AF AMP V27 6AV6
POWER OUTPUT V28 6V6GT
POWER OUTPUT V29 6V6GT
PHASE INV V30 6C4
RECT V31 5Y3GT
COUPLED
SECT 3 FRONT
SECT 2 FRONT
SECT 1 FRONT
SECT 2 REAR
SECT 3 REAR
SECT 1 REAR
TV AUDIO INPUT
33⅓ - 78 RPM PHONO INPUT
45 RPM PHONO INPUT
33⅓ - 78 RPM PHONO MOTOR SOCKET
45 RPM PHONO MOTOR SOCKET
POWER SOCKET
SW OR VOL CONT
VOL CONT
LOW TONE CONT
HI TONE CONT
IF = 455 KC AM
IF = 10.7 MC FM
FUNCTION SW SHOWN IN PHONO 33⅓ - 78 RPM POSITION
SWITCH SEQUENCE
1 - PHONO 33⅓ - 78 RPM
2 - PHONO 45 RPM
3 - AM
4 - FM
5 - TV

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V22	6CB6	0V	0V	0V	6.3VAC	215VDC	230VDC	0V	
V23	6J6	155VDC ±80VDC	110VDC ±80VDC	6.3VAC	0V	-1.3VDC	91-3.7VDC ±1-5.5VDC	0V	
V24	6BA6	0 - 1VDC +.3VDC	0V	6.3VAC	0V	110VDC +.115VDC	110VDC +.115VDC	0V	
V25	6AU6	0V	0V	0V	6.3VAC	180VDC	180VDC	-1.3VDC	
V26	6AL5	1.3VDC	0 - .5VDC	6.3VAC	0V	0 - .5VDC	0V	0 - .5VDC	
V27	6AV6	-.4VDC	0V	6.3VAC	0V	-.3VDC	0 - 1VDC +.5VDC	83VDC	
V28	6C4	305VDC	0V	6.3VAC	0V	305VDC	-3.5VDC	12VDC	
V29	6V6GT	0V	0V	265VDC	315VDC	-6.4VDC	-14VDC	6.3VAC	0V
V30	6V6GT	0V	0V	265VDC	315VDC	-6.7VDC	-16VDC	6.3VAC	0V
V31	5Y3GT	0V	330VDC	1	330VAC	1	330VAC	1	330VDC

† TAKEN WITH VACUUM TUBE VOLTMETER
‡ (117VAC ACROSS PINS 3, 5, 7 OF V31)
? TAKEN IN FM POSITION
+ TAKEN IN AM POSITION

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V22	6CB6	92.7 Meg ±5.5 Meg	560Ω	0Ω	1Ω	97.3KΩ ±3.9KΩ	±470KΩ	0Ω	
V23	6J6	±75KΩ	±10KΩ	1Ω	0Ω	4.7 Meg	18KΩ	0Ω	
V24	6BA6	±3.5Meg	0Ω	1Ω	0Ω	±1.1KΩ	±25KΩ	68Ω	
V25	6AU6	4Ω	0Ω	0Ω	1Ω	±1.1KΩ	±25KΩ	120Ω	
V26	6AL5	3.3KΩ	40KΩ	1Ω	0Ω	2 Inf.	1Ω	2 Inf.	
V27	6AV6	11 Meg	0Ω	1Ω	0Ω	±430KΩ	95-0.5KΩ ±5.5 Meg.	±370KΩ	
V28	6C4	±68KΩ	Inf	1Ω	0Ω	±68KΩ	68KΩ	2.6KΩ	
V29	6V6GT	0Ω	0Ω	±30Ω	±1.2KΩ	562KΩ	270Ω	1Ω	0Ω
V30	6V6GT	0Ω	0Ω	±56Ω	±1.2KΩ	470KΩ	270Ω	1Ω	0Ω
V31	5Y3GT	Inf.	60KΩ	Inf	50KΩ	Inf	50KΩ	Inf	140KΩ

* MEASURED FROM PIN 8 OF V31

DOTTED IN PARTS ARE NOT USED IN ALL MODELS WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN

@ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RCA VICTOR MODELS 9T57, 9T77,
9T79 (Ch. KCS49, A, AT, T), 9T89 (Ch. KCS60, A, AT, T)

RADIO SCHEMATIC - CHASSIS RC1092

TV PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: RCA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6CB6	6CB6	6CK	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF	6AU6	6AU6	7BK	
V4	2nd Video IF	6CB6	6CB6	6CK	
V5	3rd Video IF	6AU6	6AU6	7BK	
V6	4th Video IF	6CB6	6CB6	6CK	
V7	DET. -AGC Rect.	6AL5	6AL5	6BT	
V8	Video Amp.	12AU7	12AU7	9A	
V9A	AGC Amp. -DC Rest. -Sync. Sep. - Sync. Amp.	12AU7	12AU7	9A	
B	AGC Amp. -DC Rest. -Sync. Sep.	12AU7	12AU7	9A	
V10	Sound IF Amp.	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Sound Discr.	6AL5	6AL5	6BT	
V13	Bias Clamp.	6AV6	6AV6	7BT	In Ch. KCS49, A, AT, T, V13 is used as bias clamper and AF Amp.
V14A	Vert. Osc. -AGC Clamp.	6SN7GT	6SN7GT	8BD	Chassis KCS60
B	Sync. Amp. -Vert. Osc.	6SN7GT	6SN7GT	8BD	Chassis KCS49AT, T, 60T
C	Vert. Osc.	6J5	6J5	6Q	Used in chassis KCS49, KCS49A
V15	Vert. Output	6K6GT	6K6GT	7S	
V16	Hor. AVC-Hor. Osc.	6SN7GT	6SN7GT	8BD	
V17	Hor. Output	6BG6G	6BG6G	5BT	
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rect.	1B3GT	1B3GT	3C	
V20	LV Rect.	5U4G	5U4G	5T	
V21	Picture Tube	19AP4A	19AP4A	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: RCA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	35	450	75510	AFH7721J		UPT420		TVL-3785	▬ Filter
B	35	450						TVA-1702	■ Filter
C	10	450							▲ Hor. AFC Plate Dec.
D	5	450							V. Amp. Dec.
C2A	35	450	75510	AFH7721J		UPT420		TVL-3785	▬ Filter
B	35	450						TVA-1702	■ Filter
C	10	450							▲ Filter
D	5	450							Decoupling
C3A	20	450	75592	AFH4J16E10B		UPT420		TVL-3709	▬ Vert. Output Dec.
B	80	200							■ Filter
C	50	50							▲ Vert. Output Cath.
C4	5	450	28417	PRS450/4		BR445		TVA-1702	Decoupling
C5	2	50	73747	E26F3		BBR2-50T		TVA-1301	AGC Filter
C6	100		75437	SI100	D6-101		GP1K-100	19C11	RF Coupling
C7	39		75450		TCZ-39		NPOL-39		Fixed Trimmer
C8	270		75199	SI270	D6-271		GP2K-270	19C31	RF Coupling
C9	5000		73473	BPD-005	DD-502		811-005	29C1	AGC Filter
C10A	1500		75089	BPD-2 x 0015	DD-2-152		812-2 x 0015	29C6	RF Amp. Screen
B	1500								RF Amp. Fil.
C11	12		75200	SI12	TCZ-12		GP1K-12	19C22	RF Amp. Cath.
C12	270		75199	SI270	D6-271		GP2K-270	19C31	RF Coupling
C13	270		75199	SI270	D6-271		GP2K-270	19C31	RF Coupling
C14	390		75641	SI390	D6-391		GP2K-390		RF Coupling
C15	4		75289				NPOK-4		Fixed Trimmer
C16	15		45465		TCZ-15		NPOK-15	19C5	Osc. Feedback
C17	39		75196		TCN-39		N750L-39		Osc. Grid Cap.
C18	.68		71504		TCZ-.68				Fixed Trimmer
C19	1500		75166						Conv. Decoupling
C20	1500		73748	BPD-0015	DD-152		801-0015	29C8	Conv. Filament
C21	1500		75166						Filament Bypass
C22	1500		75166						RF Bypass
C23	1500		75166						RF Bypass
C24	6.8		75197	SI6.8NPO	TCZ-6.8		NPOK-6.8		Fixed Trimmer
C25A	1500		75089	BPD-2 x 0015	DD-2-152		812-2 x 0015	29C6	RF Bypass
B	1500								RF Bypass
C26	10000		73960	BPD-01	DD-103		821-01	36C1	AGC Filter †
C27	56		71924		TCN-56		N750L-56		Fixed Trimmer
C28	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	AGC Filter
C29	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	AGC Filter
C30	82				TCZ-82		NPOM-82		Fixed Trimmer
C31A	10000		73960	BPD-01	DD-3-103	PTE6S1	821-01	36C1	1st V. IF Screen *
B	10000		73960	BPD-01		PTE6S1	821-01	36C1	1st V. IF Plate Dec. *
C32	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	1st V. IF Fil.
C33	47				TCZ-47		NPOM-47	29C14	Fixed Trimmer
C34	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	RF Bypass
C35	270	1000	73091	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	IF Coupling
C36A	1500		75089	BPD-2 x 0015	DD-2-152	1W5D15	812-2 x 0015	29C6	AGC Filter
B	1500					1W5D15			2nd V. IF Fil.
C37	10000		73960	BPD-01	DD-103	PTE6S1	821-01	36C1	2nd V. IF Screen
C38	10000		73960	BPD-01	DD-103	PTE6S1	821-01	36C1	2nd V. IF Dec.
C39	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	RF Bypass
C40	47				TCZ-47		NPOM-47	29C14	Fixed Trimmer
C41A	1500		75089	BPD-2 x 0015	DD-2-152	1W5D15	812-2 x 0015	29C6	AGC Filter
B	1500					1W5D15			1st S. IF Grid Filter
C42	270	1000	73091	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	IF Coupling
C43	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	RF Bypass
C44	10000		73960	BPD-01	DD-103	PTE6S1	821-01	36C1	3rd V. IF Plate Dec.
C45	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	3rd V. IF Screen
C46	.1	400	73551	P488-1	DF-104	PTE4P1		4TM-P1	3rd V. IF Screen
C47	5000		73478	BPD-005	DD-502	1D5D5	811-005	29C1	3rd V. IF Fil.
C48	270	1000	73091	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	IF Coupling

RADIO PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (CONT.)

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	
R144	18KΩ	½			Osc. Grid
R145	33KΩ	½		BTS-33K	Osc. Plate Decoupling
R146	2.2 Meg.	½		BTS-2.2 Meg.	AVC Network
R147	2.2 Meg.	½		BTS-2.2 Meg.	AVC Network
R148	150KΩ	½		BTS-150K	Diode Load
R149	220KΩ	½		BTS-220K	Diode Load
R150	68Ω	½			1st IF Amp. Cathode
R151	22KΩ	½			1st IF Amp. Screen
R152	680Ω	½		BTS-680	Decoupling
R153	39KΩ	½		BTS-39K	Decoupling-See Note 15
R154	120Ω	½			2nd FM IF Amp. Cathode
R155	22KΩ	½			2nd FM IF Amp. Screen
R156	680Ω	½		BTS-680K	Decoupling
R157	22 Meg.	½		BTS-22 Meg.	AVC Network
R158	470KΩ	½		BTS-470K	AVC Network
R159	1200Ω 5%	½		BTS-1200-5%	Ratio Detector Diode Load
R160	3300Ω 5%	½		BTS-3300-5%	Ratio Detector Diode Load
R161	39KΩ 5%	½		BTS-39K-5%	Ratio Detector Diode Load
R162	56KΩ	½		BTS-56K	Diode Filter
R163	100Ω	½		BTS-100	Balancing
R164	15KΩ	½		BTS-15K	De-emphasis
R165	150KΩ	½		BTS-150K	Tone Compensation
R166	1.5 Meg.	½		BTS-1.5 Meg.	Phono Input Shunt
R167	1.5 Meg.	½		BTS-1.5 Meg.	Phono Input Shunt
R168	27KΩ	½		BTS-27K	Tone Compensation
R169	18KΩ	½		BTS-18K	Tone Compensation
R170	27KΩ	½		BTS-27K	Tone Compensation-See Note 17
R171	10 Meg.	½		BTS-10 Meg.	AF Amp. Grid
R172	270KΩ	½		BTS-270K	AF Amp. Plate
R173	3300Ω 5%	½		BTS-3300-5%	Phase Inverter Cathode
R174	82KΩ	½		BTS-82K	Phase Inverter Plate
R175	68KΩ	½		BTS-68K	Phase Inverter Grid
R176	470KΩ	½		BTS-470K	Output Grid
R177	470KΩ	½		BTS-470K	Output Grid
R178	100Ω	½			Parasitic Suppressor
R179	2200Ω	5		1 3/4A-2250	Filter-Wire Wound
R180	270Ω	2		BW-2-270	Bias Network
R181	1000Ω	½		BTS-1000	Bias Network
R182	3Ω	½		BW-½-3	Series Pilot Light-Wire Wound-See Note 14

Note 14. Not used in all models.
Note 15. Some models use 120KΩ resistor in this application.
Note 16. Some models use 33KΩ resistor in this application.
Note 17. Some models use 100KΩ resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T6	117VAC ⓐ .7A	640VCT .065ADC	5VAC ⓐ 2A	6.3VAC ⓐ 4.5A	75566		P-3051	PV-70 ② ③

② Add series resistor to reduce voltage.
③ Drill new mounting holes.

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	RCA PART No.	MEISSNER PART No.	
L39	FM Ant. Coil	0Ω		75615		
L40	FM RF Coil	0Ω		74815		
L41	FM Osc. Coil	0Ω		74817		
L42	Loop Ant.	.1Ω	1.4Ω	75705		Less cable
L43	AM RF Coil	73Ω	4.2Ω	75570		
L44	AM Osc. Coil	1.2Ω	7.5Ω	75569		2.2Ω pick-up winding
L45	1st AM IF	5Ω	12Ω	75558		12Ω tertiary winding
L46	1st FM IF	.2Ω	.2Ω	75559		
L47	Fil. Choke	.3Ω		71942		
L48	2nd AM IF	15Ω	15Ω	73037		
L49	2nd FM IF	1.2Ω	.4Ω	75560		
L50	Ratio Det. Trans.	1.3Ω	.3Ω	73743		

PHONO CARTRIDGE and NEEDLE

ITEM No.	REPLACEMENT DATA					REMARKS
	RCA PART No.	ASTATIC PART No.		SHURE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M8	74625	CAC-J	Q-33	W21AR	A65MG	

ASTATIC AND SHURE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED.

PHONO CARTRIDGE and NEEDLE

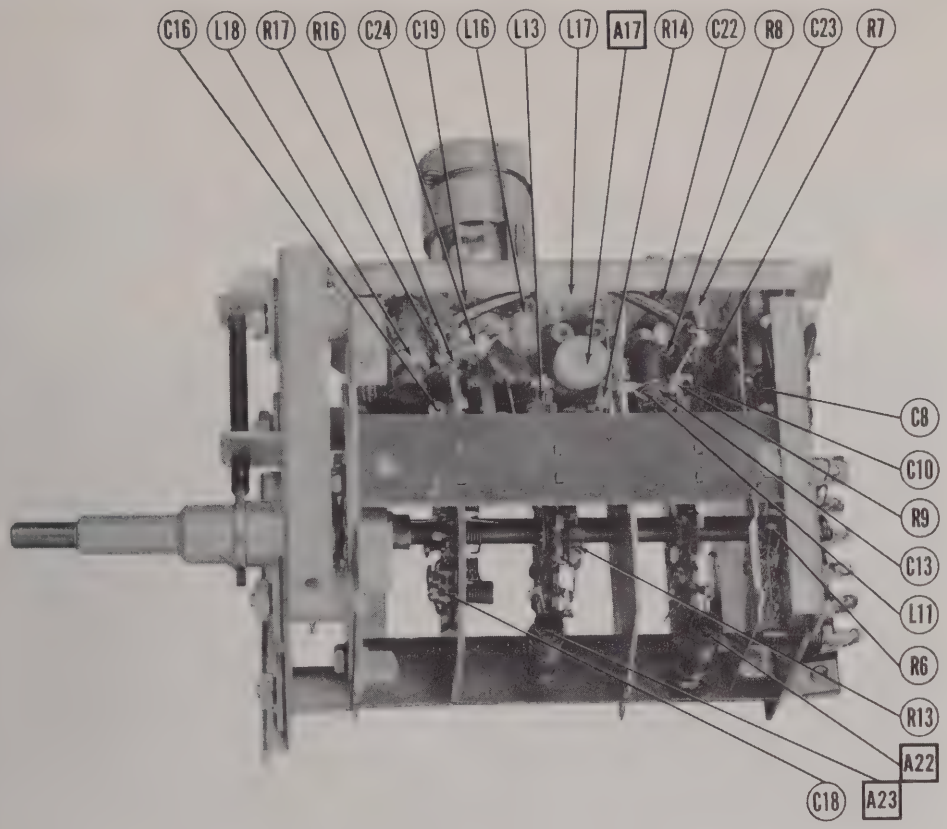
ITEM No.	REPLACEMENT DATA					REMARKS
	RCA PART No.	ASTATIC PART No.		SHURE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M9	75475					

DIAL LIGHTS

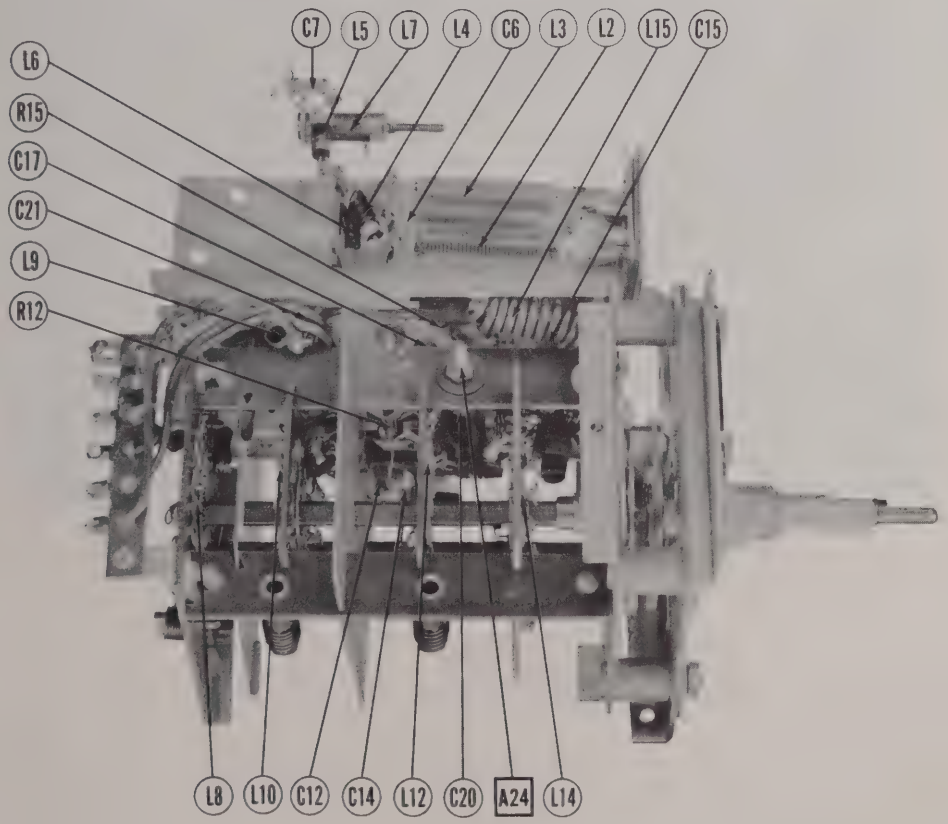
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					RCA PART No.		
M10	Bayonet	7.5	.2	White	11765		Type #51
M11	Bayonet	7.5	.2	White	11765		Type #51
M12	Bayonet	7.5	.2	White	11765		Type #51, jewel light

MISCELLANEOUS

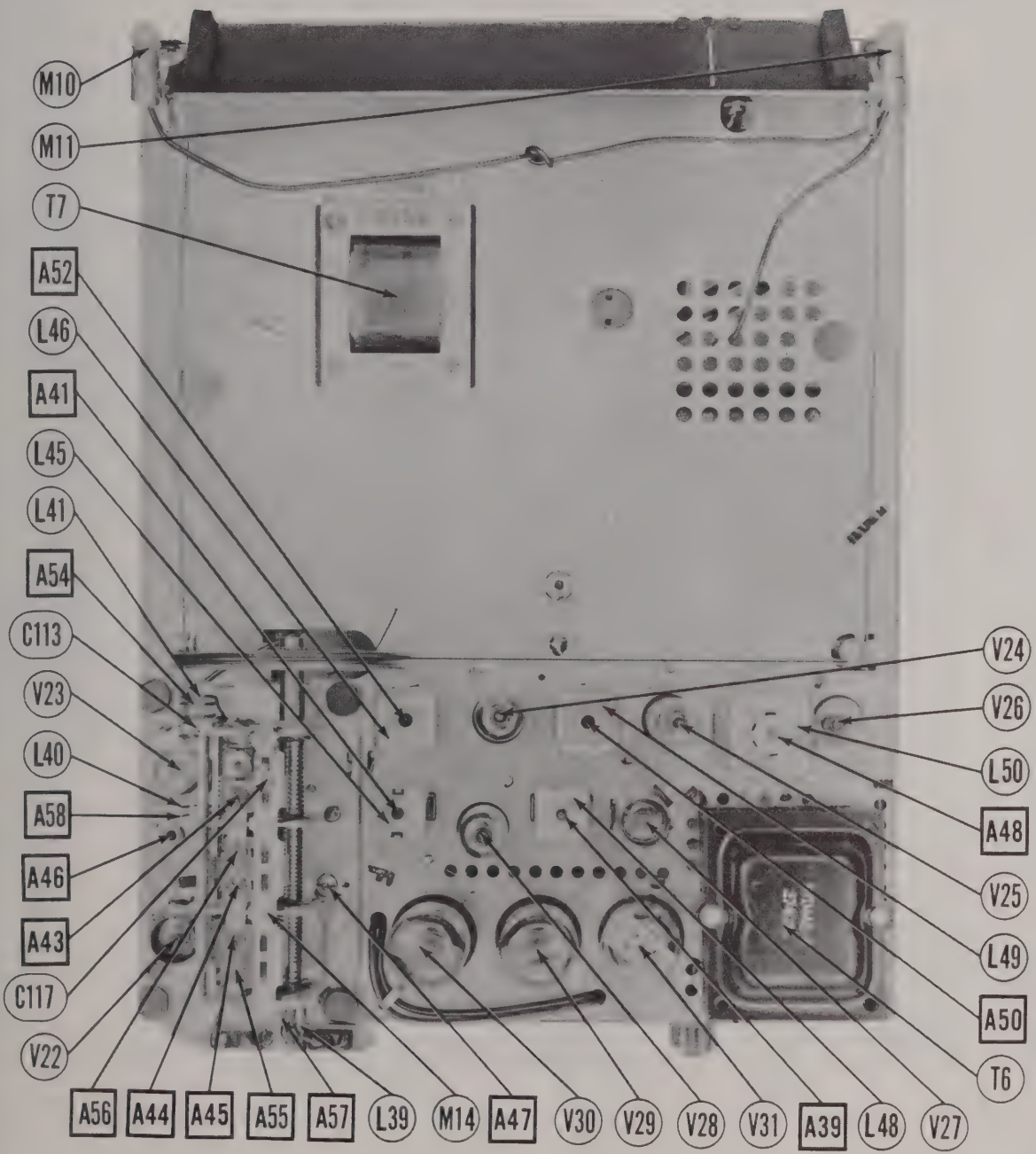
ITEM No.	PART NAME	RCA PART No.	NOTES
M13	Switch	75586	Function TV-FM-AM-Phono 45-Phono 78, 33
M14	Tuning Capacitor	75576	(24-531MMF, 20-305MMF, 35-205MMF)
	Knob	75712	Tone, tuning, volume, (maroon)
	Knob	75714	Function switch, (maroon)



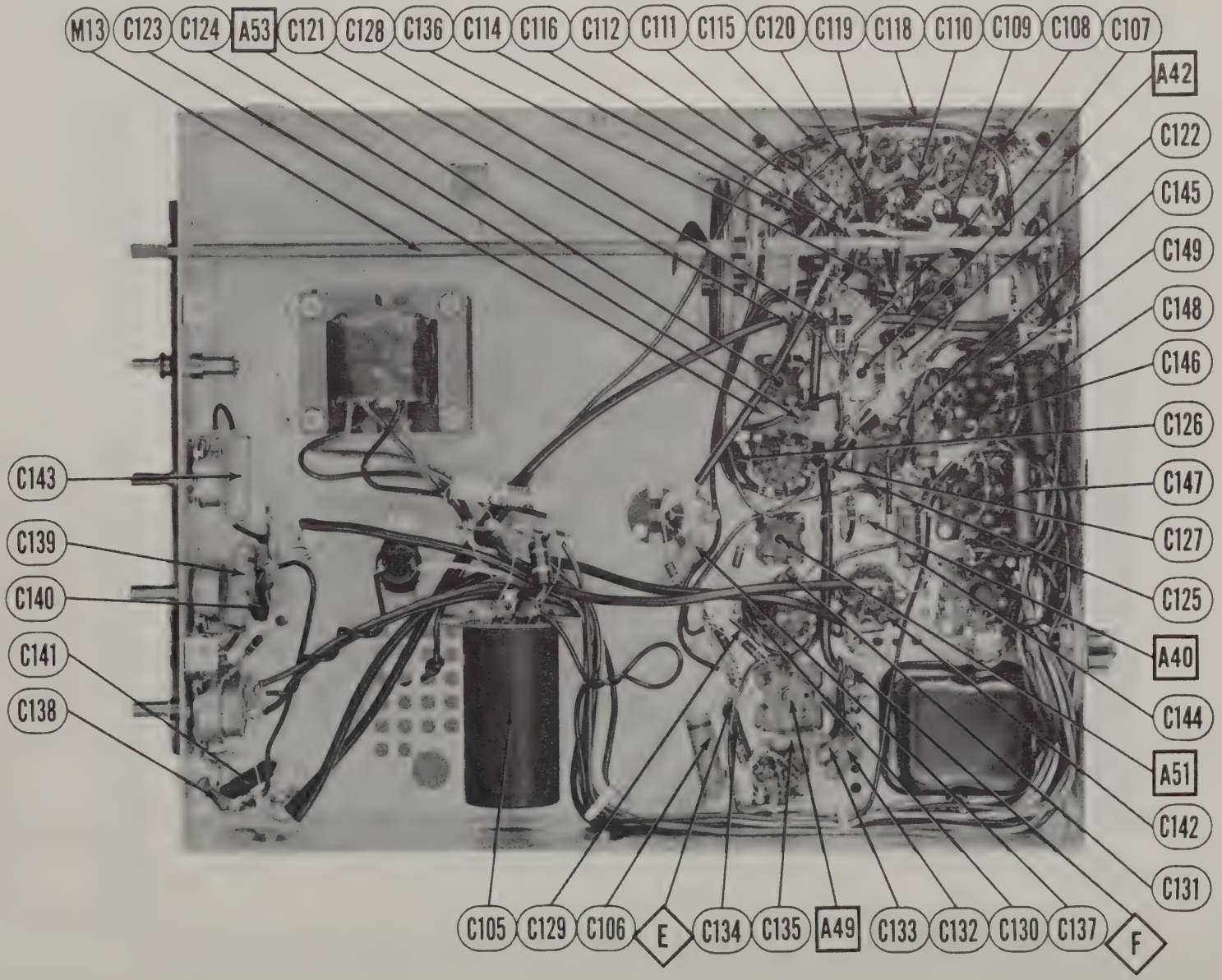
RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

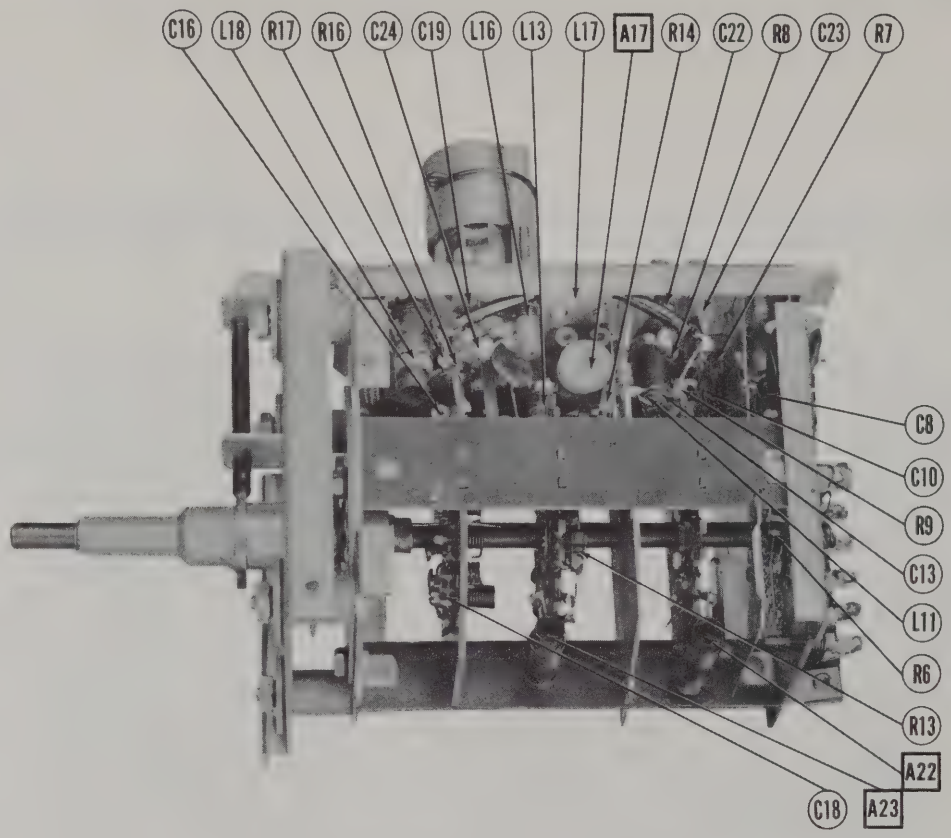


RADIO CHASSIS-TOP VIEW

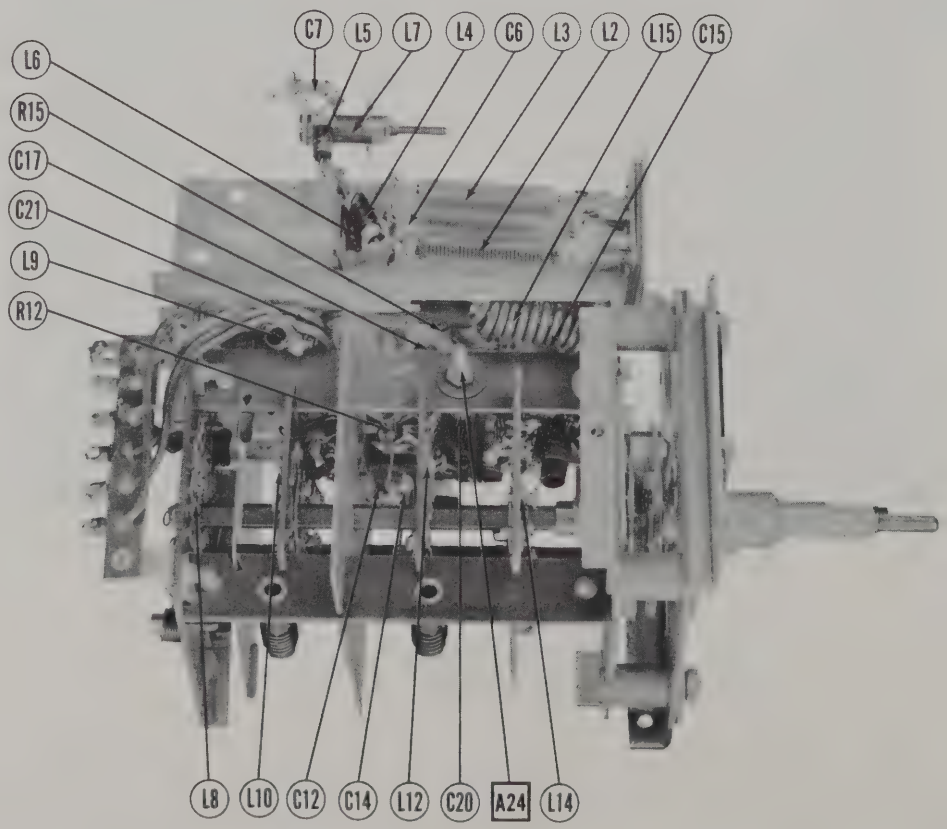


RADIO CHASSIS-BOTTOM VIEW- CAPACITOR AND ALIGNMENT IDENTIFICATION

RADIO CHASSIS-BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

TV PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA RCA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C49	75			SI75NPO	TCZ-75	NPOM-75			Fixed Trimmer
C50	100		45469	SI100NPO	TCZ-100	5R5T1	NPOM-100	36C10	4th V. IF Cath.
C51	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	4th V. IF Screen
C52	.047	400	73553	P488-047	DF-503	PTE4S5		4TM-S47	4th V. IF Screen
C53	5000		73478	BPD-005	DD-502	1D5D5	811-005	29C1	4th V. IF Fil.
C54A	1500		75089	BPD-2 x 0015	DD-2-152	1W5D15	812-2 x 0015	29C6	4th V. IF Plate Dec.
B	1500					1W5D15			RF Bypass
C55	270	1000	73091	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	IF Coupling
C56	100		39396	SI100	D6-101	5W5T1	GP1K-100	19C11	IF Coupling
C57	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	AGC Filter
C58	.47	200	73787	P288-47		GT2P5		2TM-P47	AGC Filter
C59	10		53511	SI10	D6-100	5W5Q1	GP1K-10	19C3	V. Diode Filter
C60	.1	400	73551	P488-1	DF-104	PTE4P1		4TM-P1	Video Coupling
C61	.0015	600	73598	P688-0015	D6-152	PTE6D2	GP2L-0015	6TM-D15	V. Amp. Cath.
C62	.047	600	73592	P688-047	DF-503	PTE6S5		6TM-S47	Video Coupling
C63	.015	400	73797	P488-015		PTE6S15		6TM-S15	Video Coupling
C64	.0022	600	73595	P688-0022	D6-222	PTE6D2	GP2M-0022	6TM-D22	DC Res. -Sync. Sep. Grid.
C65	.1	600	73557	P688-1	DF-104	PTE6P1		6TM-P1	Pic. Tube Cath.
C66	10000		73960	BPD-01	DD-103	PTE6S1	821-01	36C1	1st S. IF Dec.
C67	1500		73748	BPD-0015	DD-152	1W5D15	801-0015	29C8	1st S. IF Cath.
C68	1500		75166	SI1500	D6-152	1W5D15	GP2L-0015	29C8	Limiter Decoupling
C69	1500		75166	SI1500	D6-152	1W5D15	GP2L-0015	29C8	Limiter Screen
C70	270		75244	SI270	D6-271	5W5T25	GP2K-270	19C31	RF Bypass
C71	.001	600	75249	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	De-emphasis †
C72	5000		73478	BPD-005	DD-502	1D5D5	811-005	29C1	Discr. Fil.
C73	.47	200	73787	P288-47		GT2P5		2TM-P47	Sync. Amp. Cath.
C74	.01	400	73561	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Vert. Sync. Coupling
C75	.0022	400	73595	P688-0022	D6-222	PTE6D2	GP2M-0022	6TM-D22	Integrator Net.
C76	.0047	600	73920	P688-0047	D6-472	PTE6D5	GP2M-0047	6TM-D47	Integrator Net.
C77	.0047	600	73920	P688-0047	D6-472	PTE6D5	GP2M-0047	6TM-D47	Integrator Net.
C78	.01	600	73594	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Vert. Osc. Grid
C79	.047	1000	73597	P1088-047		PTE16S5		MB-S5	Vert. Discharge
C80	.22	600	74957	684-25		GT6P25		6TM-P25	Vert. Sweep Coupling
C81	.022	400	73562	P488-022		PTE6S2		4TM-S22	Fixed Trimmer
C82	82	1000	73090						Hor. Sync. Coupling
C83	82	1000	73090						Hor. Feedback
C84	.047	400	73553	P488-047	DF-503	PTE4S5		4TM-S47	AFC Filter
C85	.022	400	73562	P488-022	DF-203	PTE4S2		4TM-S22	AFC Filter
C86	.47	200	73787	P288-47		GT2P5		2TM-P47	AFC Filter
C87	.047	600	73592	P688-047	DF-503	PTE6S5		6TM-S47	Hor. AFC Plate
C88	180	1000	73102						Hor. Osc. Grid
C89	.01	600	73594	P688-01		PTE6S1		6TM-S1	Fixed Trimmer
C90	.001	1000	75643	P1088-001		PTE16D1		MB-D1	Hor. Fischarge
C91	560	500	74250	1469-0005	D6-561	5R5T5	GP2K-560	MS-35	Hor. Sweep Coupling
C92	.047	1000	73597	P1088-047		GT16S5		MB-S5	Hor. Output Screen
C93	100		39396	SI100	D6-101	5W5T1	GP1K-100	19C11	Hor. Output Screen
C94	.22	400	73794	P488-22		GT4P25		4TM-P22	Hor. Output Cath.
C95	.018	1000	74727						Damper Filter ‡
C96	.018	1000	74727						Damper Filter
C97	4.7	5000	75646						Fixed Trimmer
C98	500	20000	74154	HV20B	TV1-502				HV Filter §
C99	.047	1000	73597	P1088-047		GT16S5		MB-S5	Fixed Trimmer
C100	.047	1000	73597	P1088-047		GT16S5		MB-S5	Fixed Trimmer
C101	.047	400	75071	P488-047	DF-503	PTE4S5		4TM-S5	Line Filter
C102	.047	400	75071	P488-047	DF-503	PTE4S5		4TM-S5	Line Filter
C103	390	500	73904	1469-0004	D6-391	5R5T4	GP2K-390	MS-34	Video Coupling
C104	.0022	600	73595	P688-0022	D6-222	PTE6D2	GP2M-0022	6TM-D22	Sync. Coupling

* Some models use 1500MMF in this application.
† Not used in all models.
‡ Some models use .022MFD in this application.
§ Some models use 250MMF in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	1 Meg.			Concentrikit			
B	50KΩ		75215	B11-137 *	RTV-65	SBB-510	Vert. hold control-front
C	Shaft End			B11-123 *			Horiz. hold control-rear
				E-187 *			Attach per instr. in "Concentrikit".
R2A	50KΩ		75216		RTV-191	SBB-511	Brightness control-front
B	3500Ω						Contrast control-rear
R3A	2.5 Meg.		71440	Q11-239	AM-84-S	AN-83	Height control
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Attach to R3A per instructions
R4A	5000Ω		71441	Q11-114	AM-19-S	AN-10	Vert. linearity control
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Attach to R4A per instructions
R5A	20KΩ		75516	Q11-119	AM-36-S	AN-22	Width control
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Attach to R5A per instructions

* Additional parts to be used with "Concentrikit"

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R6	3900Ω			BTS-3900	Antenna Coil Shunt
R7	27Ω				RF Amp. Cathode
R8	22KΩ	1			RF Amp. Screen
R9	3300Ω			BTS-3300	RF Amp. Plate
R10	3900Ω			BTS-3900	AGC Network
R11	150Ω 20%			BTS-150	AGC Network
R12	100KΩ 20%			BTS-100K	Series Test Point
R13	8200Ω				RF Coil Shunt
R14	100KΩ				Mixer Grid
R15	100KΩ				Osc. Grid
R16	10KΩ 20%				Osc. Plate

TV PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	WATTS	REPLACEMENT DATA RCA PART No.	IRC PART No.	IDENTIFICATION CODES
R17	10KΩ 5%	1			Converter Transformer Shunt
R18	2.2 Meg.	1		BTS-2.2 Meg.	Voltage Divider
R19	100Ω 20%	1		BTS-100	Decoupling
R20	100Ω 20%	1		BTS-100	Decoupling
R21	10KΩ	2		BTB-10K	Voltage Divider
R22	39KΩ	2		BTB-39K	Voltage Divider
R23	39KΩ	2		BTB-39K	Voltage Divider
R24	39KΩ	2		BTB-39K	Voltage Divider
R25	33KΩ	1		BTS-33K	AGC Network
R26	1000Ω 20%	1		BTS-1000	AGC Network
R27	470Ω	1		BTA-470	1st Video IF Transformer Shunt-See Note 1
R28	10KΩ	1			1st Video IF Transformer Shunt-See Note 12
R29	120Ω	1		BTS-120	1st Video Amp. Cathode
R30	33KΩ	1			1st Video Amp. Screen
R31	1000Ω 20%	1		BTS-1000	Plate Decoupling
R32	1000Ω 20%	1		BTS-1000	AGC Network
R33	8200Ω 5%	1			2nd Video IF Amp. Grid
R34	120Ω	1		BTS-120	2nd Video IF Amp. Cathode
R35	47KΩ 20%	1			2nd Video IF Amp. Screen
R36	12KΩ 5%	1			2nd Video 1. Amp. Plate
R37	1000Ω 20%	1		BTS-1000	2nd Video 1e Amp. Decoupling
R38	82Ω	1		BTS-82	3rd Video IF Amp. Cathode
R39	33KΩ	1			3rd Video IF Amp. Screen
R40	3900Ω 5%	2		BTB-3900-5%	3rd Video IF Amp. Plate-See Note 6
R41	1000Ω 20%	1		BTS-1000	3rd Video IF Amp. Plate Decoupling
R42	180Ω	1		BTS-180	4th Video IF Amp. Cathode
R43	1000Ω 20%	1		BTS-1000	4th Video IF Amp. Screen
R44	33KΩ	1		BTS-33K	4th Video IF Amp. Screen Decoupling
R45	8200Ω 5%	1		BTS-8200-5%	4th Video IF Amp. Plate-See Note 7
R46	1000Ω 10%	1		BTS-1000	4th Video IF Amp. Plate Decoupling
R47	5600Ω 5%	1		BTS-5600-5%	Video Detector Diode Load
R48	33KΩ 20%	1		BTS-33K	AGC Rectifier Plate
R48	18KΩ	1		BTS-18K	AGC Network
R50	18KΩ	1		BTS-18K	AGC Network
R51	47KΩ	1		BTS-47K	AGC Network
R52	390KΩ	1		BTS-390K	Voltage Divider-See Note 10
R53	150KΩ	1		BTS-150K	AGC Network
R54	220Ω	1		BTS-220	Video Amp. Cathode
R55	100KΩ	1		BTS-100K	Voltage Divider
R56	4700Ω 5%	1		BTS-4700-5%	Video Amp. Plate
R57	560KΩ	1		BTS-560K	Video Amp. Grid
R58	220Ω	1		BTS-220	Video Amp. Cathode
R59	6800Ω	1		BTA-6800	Video Amp. Plate
R60	18KΩ	2		BTB-18K	Video Amp. Decoupling
R61	6800Ω	3			Decoupling-See Note 2
R62	4700Ω	1		BTS-4700	Isolation
R63	56KΩ	1		BTS-56K	AGC Amp. Grid
R64	470KΩ	1		BTS-470K	AGC Amp. Cathode-See Note s 8, 10 and 12
R65	56KΩ	1		BTS-56K	AGC Amp. Plate-See Notes 9 and 12
R66	100KΩ	1		BTS-100K	AGC Amp. Plate-See Notes 9 and 12
R67	4700Ω	1		BTS-4700	Isolation-See Note 9
R68	820KΩ	1		BTS-820K	Picture Tube Grid
R69	150KΩ	1		BTS-150K	Picture Tube Cathode
R70	470KΩ	1			Sound IF Grid
R71	82Ω	1		BTS-82	Sound IF Cathode
R72	1000Ω 20%	1		BTS-1000	Sound IF Decoupling
R73	47KΩ	1		BTS-47K	Voltage Divider
R74	12KΩ	1		BTS-12K	Limiter Screen
R75	1000Ω 20%	1		BTS-1000	Limiter Decoupling
R76	100KΩ 5%	1		BTS-100K-5%	Discriminator Diode Load
R77	100KΩ 5%	1		BTS-100K-5%	Discriminator Diode Load
R78	22KΩ	1		BTA-22K	De-emphasis
R79	5.1Ω	1	72067	BW-5.1	Discriminator Filament-Wire Wound
R80	47KΩ	1		BTS-47K	Sync. Separator Plate
R81	390KΩ	1		BTS-390K	Voltage Divider-See Notes 3, 4 and 5
R82	5600Ω	1		BTS-5600	Voltage Divider-See Notes 9 and 12
R83	220KΩ	1		BTS-220K	Sync. Separator Cathode-See Notes 9 and 12
R84	220KΩ	1		BTS-220K	Voltage Divider-See Notes 9 and 12
R85	18KΩ	1		BTS-18K	Voltage Divider
R86	18KΩ	2		BTB-18K	Sync. Amp. Plate
R87	12KΩ	1		BTS-12K	Voltage Divider-See Note 11
R88	2200Ω 20%	1		BTS-2200	Sync. Amp. Cathode
R89	10KΩ	1		BTS-10K	Isolation-See Notes 9 and 12
R90	10KΩ	1		BTS-10K	Peaking Coil Shunt-See Notes 9 and 12
R91	22KΩ	1		BTA-22K	Voltage Divider
R92	22KΩ	1		BTA-22K	Integrator
R93	8200Ω	1		BTS-8200	Integrator
R94	8200Ω	1		BTS-8200	Integrator
R95	1 Meg. 20%	1		BTS-1 Meg.	Vert. Osc. Transformer Shunt
R96	1.2 Meg. 5%	1		BTS-1.2 Meg. 5%	Voltage Divider
R97	3.3 Meg. 5%	1/2		BTS-3.3 Meg. 5%	Vert. Osc. Grid
R98	270KΩ	1		BTS-270K	Vert. Osc. Plate
R99	12KΩ 5%	1		BTS-12K-5%	Vert. Peaking
R100	2.2 Meg.	2		BTS-2.2 Meg.	Output Grid
R101	1500Ω	1		BTA-1500	Vert. Output Cathode
R102	1000Ω 20%	1		BTS-1000	Vert. Output Decoupling
R103	15KΩ	1		BTS-15K	Vert. Linearity Control Shunt
R104	220KΩ	2		BTS-220K	Damping
R105	220KΩ	1		BTS-220K	Voltage Divider
R106	150KΩ	1		BTS-150K	Voltage Divider
R107	330KΩ	1		BTS-330K	Horiz. AFC Grid
R108	820KΩ	1		BTS-820K	Horiz. AFC Grid
R109	82KΩ	1		BTA-82K	Horiz. AFC Cathode
R110	330KΩ 5%	1		BTA-330K-5%	Horiz. AFC Cathode
R111	3900Ω	1/2		BTS-3900	Horiz. AFC Filter
R112	68KΩ	1		BTA-68K	Horiz. AFC Plate
R113	10KΩ	1/2		BTS-10K	Horiz. AFC Plate
R114	82KΩ	1		BTA-82K	Voltage Divider
R115	150KΩ	1		BTA-150K	Horiz. AFC Filter
R116	150KΩ 5%	1		BTA-150K-5%	Horiz. Osc. Grid
R117	8200Ω 5%	1/2		BTS-8200-5%	Horiz. Transformer Shunt
R118	82KΩ 5%	1		BTA-82K-5%	Horiz. Osc. Plate
R119	47Ω 20%	1/2			Parasitic Suppressor

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	WATTS	REPLACEMENT DATA RCA PART No.	IRC PART No.	IDENTIFICATION CODES
R120	1 Meg.	1/2		BTS-1 Meg.	Horiz. Output Grid
R121	100Ω	2		BW-2-100	Horiz. Output Cathode
R122	33KΩ	1/2		BTS-33K	Horiz. Output Screen
R123	6800Ω	1		BTA-6800	Voltage Divider
R124	1 Meg.	1/2		BTS-1 Meg.	Voltage Divider
R125	4000Ω	10	75512	1 3/4A-4000	Voltage Divider-Wire Wound
R126	56KΩ	1		BTA-56K	Voltage Divider
R127	56KΩ	1		BTA-56K	Bleeder-See Note 13
R128	56KΩ	1		BTA-56K	Bleeder-See Note 13
R129	10KΩ	2		BTB-10K	Bleeder-See Note 13
R130	10KΩ	2		BTB-10K	Bleeder-See Note 13
R131	8000Ω	10	75593	1 3/4A-8000	Filter-Wire Wound
R132	100KΩ 20%	2		BTB-100K	Isolation
R133	27KΩ	2		BTB-27K	Voltage Divider

Note 1. Some models use 680Ω resistor in this application.
Note 2. Some models use parallel resistors in this application.
Note 3. Late production models use 1.2 Meg. resistor in this application.
Note 4. Late production models use 390KΩ resistor in this application.
Note 5. Used only in late production models.
Note 6. Late production models use 1800Ω resistor in this application.
Note 7. Late production models use 18KΩ resistor in this application.
Note 8. Late production models use 560KΩ resistor in this application.
Note 9. Used only in chassis KCS60T.
Note 10. Chassis KCS60T uses 220KΩ resistor in this application.
Note 11. Not used in chassis KCS80T.
Note 12. Not used in all models.
Note 13. Some models use a 15KΩ, 2 watt and two 12KΩ, 2 watt resistors in parallel to replace R127, R128, R129, and R130.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ 1.5A	720VCT .200ADC	5VAC @ 3A	6.3VAC @ 1.2A SEC. 4 6.3VAC @ 8A	75508		P-3070	TP370

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	SEC.	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	165Ω	1310Ω	74144	A-8121 ①	A-4000 ①	TBO-2	Vert. Block Osc. Trans.
T3	260Ω Tap @ 25Ω	0Ω	75585				Horiz. Output Trans.
T4	465Ω	.4Ω	74950				Vert. Output Trans.
T5A	13.5Ω		74952				Vert. Deflection Coil
B	43Ω						Vert. Deflection Coil

① Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	SEC.	DC RES. PRI.	SEC.	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T7	7.8KΩ	4.7Ω	500Ω CT	.5Ω	75557		A-3020		

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA RCA PART No.	JENSEN PART No.	QUAM PART No.	NOTES
	FIELD RES.	V. C. IMP.				
SP1	PM	4.2Ω	75681	ST-10I MOD. P12-T	12A4	
	CONE DIA.	V. C. DIA.				
SP2	11 1/2"	1"	75682			

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA RCA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.200ADC	45Ω	.8 Henries	73154		C-2996	TR-3300	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	SEC.	REPLACEMENT DATA RCA PART No.	MEISSNER PART No.	IRC PART No.	NOTES
L2	Ant. Coil	.6Ω	.6Ω	73591			
L3	Ant. Coil	.6Ω	.6Ω	73591			
L4	1F Trap	.2Ω		75242			
L5	IF Trap	.2Ω		75242			
L6	Ant. Coil Shunt	0Ω		75241			
L7	FM Trap	0Ω		75449			
L8	Ant. Coils	0Ω		75180			Stator complete with rotor, coils, R6, R10, R11, C8, C9
L9	Fil. Choke	0Ω		73477			
L10	RF Coils	0Ω		75179			Stator complete with rotor, coils, R9, C13
L11	RF Coil	0Ω		75183			Includes .8-3.8 trimmer
L12	Mixer Grid Coils	0Ω		75187			Stator complete with rotor, coils, R12, R13, R14, C12, C14
L13	Mixer Grid	0Ω		75182			Includes .8-3.8 trimmer
L14	Osc. Coils	0Ω		75175			Stator complete with rotor, coils, C16, C18
L15	Fil. Choke	0Ω					Wound on coax cable, part No. 75201
L16	Mixer Plate Loading Coil	0Ω		75185			
L17	RF Choke	.3Ω		75202		CLA	.56 microhenries
L18	Conv. Trans.	.4Ω	.2Ω	75181			
L19	1st Video IF	.2Ω	6Ω	74589			With trap
L20	Fil. Choke	0Ω		73477			
L21	2nd Video IF	.1Ω		74590			With trap
L22	3rd Video IF	.2Ω	0Ω	75209			Sound take off
L23	Fil. Choke	0Ω		73477			
L24A	4th Video IF	.1Ω	.1Ω	74592			With trap
B	4th Video IF			73574			With trap-alternate
L25	Sound Trap	.1Ω	0Ω	71778			Includes C49
L26	RF Choke			76011			36 microhenries, white dots, not used in all models.
L27	5th Video IF	.4Ω		75210			
L28	Peaking	3Ω		75299			36 microhenries, orange-white dots
L29	Peaking	5Ω		75253	19-1921		120 microhenries, blue-red dots
L30	Peaking	2.6Ω		71793			36 microhenries, black dot
L31	Peaking				19-1923		500 microhenries, green-white dots, (chassis KCS60T)
L32	Peaking	5Ω		73253	19-1921		120 microhenries, blue-red dots
L33	4.5MC Trap	2.8Ω		75251			
L34	Peaking	12Ω		75252	19-1923		500 microhenries, green-white dots
L35	Sound IF	.3Ω		75211			
L36	Disc. Trans.	.1Ω	.1Ω	75212			
L37	Horiz. Osc. Trans.	130Ω	37Ω	75213			
L38	Horiz. Lin.	35Ω		71449			

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA RCA PART No.		NOTES
M1	Bayonet	6-8	.2	White	11765		Type #51, channel selector light

MISCELLANEOUS

ITEM No.	PART NAME	RCA PART No.	NOTES
M2	Fuse	73600	.25A 250V Type BEL
M3	RF Tuner		
M4	Switch	75594	Dial light
M5A	Switch	75692	AGC
B	Switch	76010	AGC(alternate)
M6A	Focus magnet	75584	
B	Focus magnet	75504	
C	Focus magnet	75935	Has green dot
M7	Ion trap	74953	
	Ant. Matching Unit	75509	Includes connector, L2, L3, L4, L5, L6, L7, C6, C7
B2, B4	Trimmer	75217	Dual(horiz. drive, horiz. lock 10-160MMF)
	Safety Glass	75819	
	Escutcheon	75455	Channel selector
	Knob	73996	Channel selec tor, maroon
	Knob	74959	Fine tuning, maroon
	Knob	74962	Vert. hold, brightness, maroon
	Knob	74963	Horiz. hold, contrast, maroon
	Knob	74969	Light switch, maroon

RCA VICTOR MODELS 9T57, 9T77, 9T79 (Ch. KCS49, A, AT, T), 9T89 (Ch. KCS60, A, AT, T)

RADIO PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		RCA PART No.	STANDARD REPLACEMENT		
V22	RF Amp.	6CB6	6CB6	6CK	
V23	Converter	6J6	6J6	7BF	
V24	1st FM AM IF	6BA6	6BA6	7BK	
V25	2nd FM IF	6AU6	6AU6	7BK	
V26	Ratio Det.	6AL5	6AL5	6BT	
V27	DET. -AVC-AF	6AV6	6AV6	7BT	
V28	Phase Inv.	6C4	6C4	6BG	
V29	Power Output	6V6GT	6V6GT	7AC	
V30	Power Output	6V6GT	6V6GT	7AC	
V31	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	RCA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C105A	30	450	72052	AFH6J10I8A		UP3345V4		TVL-3741	▲ Filter
B	30	350						TVA-1205	■ Filter
C	40	25							▲ Bias Filter
C106	2	50	73747	E26F3		BBR2-50T		TVA-1301	Stabilizing Cap.
C107	220		75611	SI220	D6-221	5W5T25	GP2K-220	19C13	RF Coupling
C108	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	RF Amp. Screen
C109	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	RF Amp. Plate Dec.
C110	100		39396	SI100	D6-101	5W5T1	GP1K-100	19C1	RF Coupling
C111	470	500	72571	1468-0005	D6-471	5W5T5	GP2K-470	1FM-35	RF Coupling
C112	15		39044	SI15	D6-150		GP1K-15	19C22	Osc. Grid Cap.
C113	68		75612		TCN-68		N750L-68	29C15	Fixed Trimmer
C114	68		75612	SI68	TCN-68		N750L-68	29C15	Osc. Feedback
C115	3		74733				N220K-3		Fixed Trimmer
C116	150		75614	SI150	D6-151	5W5T15	GP2K-150	19C12	Osc. Grid Cap.
C117	5		75612	SI5N750			N750K-5		Fixed Trimmer
C118	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	Osc. Plate Dec.
C119	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	Conv. Fil.
C120	47		75609	SI47	D6-470	5W5Q5	GP1K-47	19C25	Conv. Fil.
C121	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	Conv. Plate Dec.
C122	39				TCN-39		N750L-39		Fixed Trimmer *
C123	.05	200	73553	P288-05	DF-503	PTE4S5		2TM-S5	AVC Filter
C124	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	AVC Filter
C125	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	1st IF Dec.
C126	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	1st IF Screen
C127	150		75614	SI150	D6-151	5W5T15	GP2K-150	19C12	Diode RF Filter
C128	150		75614	SI150	D6-151	5W5T15	GP2K-150	19C12	Diode RF Filter
C129	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	2nd IF Dec.
C130	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	2nd IF Screen
C131	.005	200	71926	P688-005	D6-502	PTE6D5	811-005	6TM-D5	2nd IF Cath.
C132	330	500	39640	1468-0003	D6-331	5W5T3	GP2K-330	1FM-335	Diode Load Cap. †
C133	330	500	39640	1468-0003	D6-331	5W5T3	GP2K-330	1FM-335	Diode Load Cap. †
C134	.005	100	71926	P688-005	D6-502	PTE6D5	811-005	6TM-D5	RF Bypass
C135	.005	200	71926	P688-005	D6-502	PTE6D5	811-005	6TM-D5	De-emphasis
C136	1800		75610	SI1800	D6-182		GP2M-0018		Tone Comp. ‡
C137	.001	200	73801	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	Tone Comp.
C138	1500		75610	SI1500	D6-152	1W5D15	GP2L-0015	29C8	Audio Coupling
C139	.018	200	58476						Tone Comp.
C140	.015	200	7212 0	P488-015		PTE6S15		6TM-S15	Tone Comp.
C141	.02	100	74010	P488-02	DF-203	PTE4S2		2TM-S2	Audio Coupling
C142	100		75437	SI100	D6-101	5W5T1	GP1K-100	19C11	AF Amp. Plate
C143	.005	400	71926	P688-005	D6-502	PTE6D5	811-005	6TM-S5	Tone Comp.
C144	.01	400	71925	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C145	.02	400	74010	P488-02	DF-203	PTE4S2		4TM-S2	Audio Coupling
C146	150		75614	SI150	D6-151	5W5T15	GP2K-150	19C12	Output Screen
C147	.001	1200	70642	P1688-001		PTE16D1		MB-D1	Output Plate
C148	.001	1200	70642	P1688-001		PTE16D1		MB-D1	Output Plate
C149	5000		73473	BPD-005	DD-502	1D5D5	811-005	29C1	Output Fil.

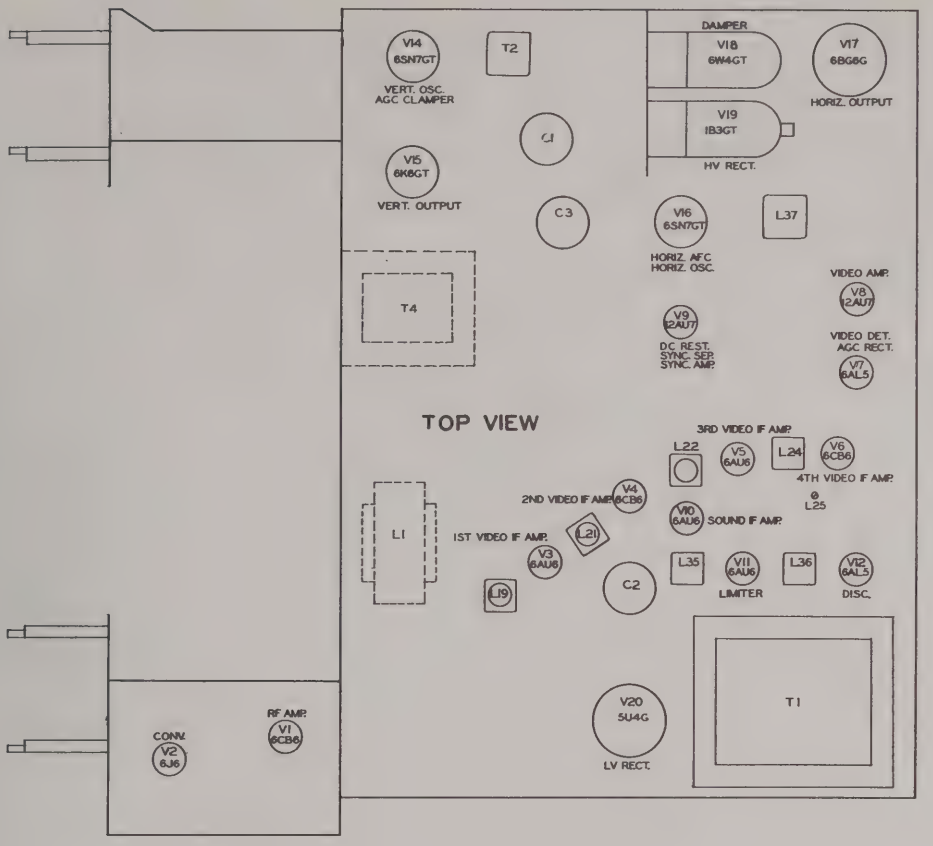
* Not used in all models.
† When either items C132 or C133 are replaced, replace both with capacitors of equal value.
‡ Some models use 1500MMF in this application.

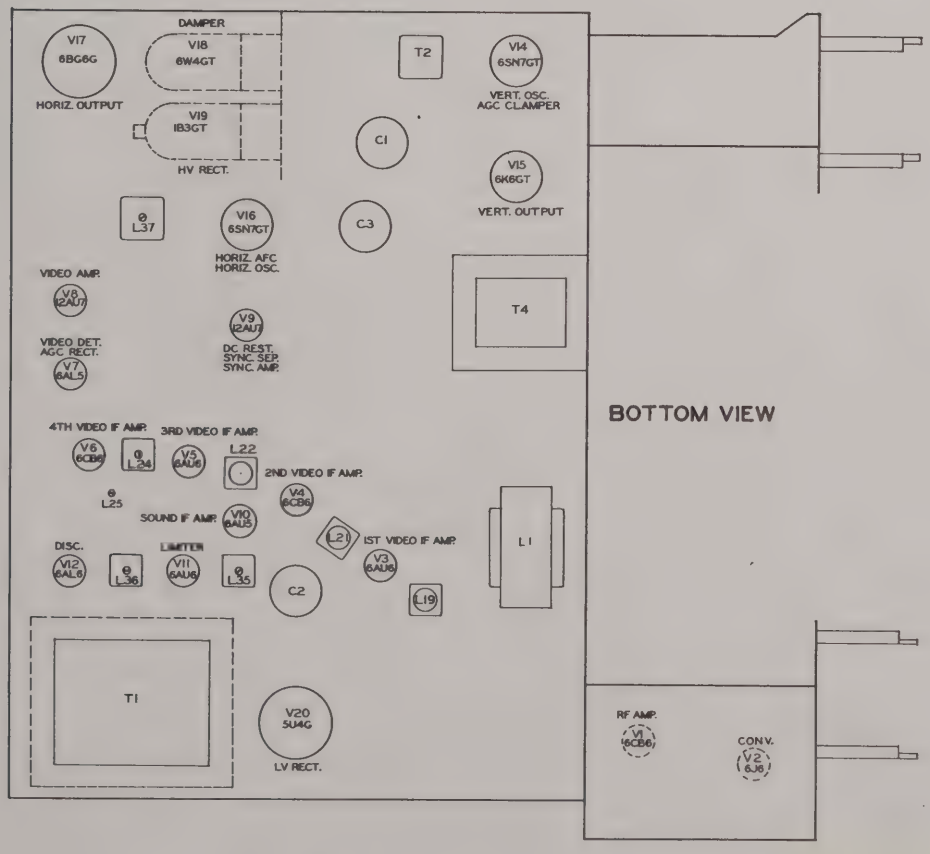
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R134A	1.5 Meg.	½	75537	Q18-139XX	AT-95		Volume control-tapped at 250KΩ and 500KΩ
B	Shaft		Not Req.		FS-3		Attach to R134A per instructions
C	Switch		Not Req.		SWB		Attach to R134A per instructions
R135A	2 Meg.	½	75561	Q13-139	AG-66-Z	B-76	Low tone control
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Attach to R135A per instructions
R136A	2 Meg.	½	75562	Q13-139	AG-66-Z	B-76	High tone control
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Attach to R136A per instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	RCA PART No.	IRC PART No.	
R137	2.2 Meg.	½			RF Amp. Grid
R138	68Ω	½			RF Amp. Cathode
R139	470KΩ	½			RF Amp. Screen-See Note 16
R140	8200Ω	1			RF Amp. Plate
R141	680Ω	½		BTS-680	RF Amp. Decoupling
R142	390Ω	½			Parasitic Suppressor
R143	100Ω	½			Parasitic Suppressor





TUBE PLACEMENT CHART

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	-.2VDC	.3VDC	0V	6.3VAC	155VDC	85VDC	0V		
V 2	6J6	65VDC	125VDC	0V	6.3VAC	-1.1VDC	§-3VDC	0V		
V 3	6AU6	-.2VDC	0V	0V	6.3VAC	105VDC	115VDC	.8VDC		
V 4	6CB6	-.2VDC	.9VDC	6.3VAC	0V	100VDC	90VDC	0V		
V 5	6AU6	-.2VDC	0V	0V	6.3VAC	80VDC	100VDC	.5VDC		
V 6	6CB6	0V	1.6VDC	6.3VAC	0V	120VDC	115VDC	0V		
V 7	6AL5	0V	-.4VDC	0V	6.3VAC	0V	0V	-.5VDC		
V 8	12AU7	100VDC	-.4VDC	5.7VDC	6.3VAC	6.3VAC	270VDC	95VDC	115VDC	0V
V 9	12AU7	6.2VDC	0V	1.1VDC	6.3VAC	6.3VAC	35VDC	6VDC	7VDC	0V
V 10	6AU6	-.3VDC	0V	0V	6.3VAC	105VDC	105VDC	.5VDC		
V 11	6AU6	-.9VDC	0V	0V	6.3VAC	110VDC	70VDC	0V		
V 12	6AL5	0V	-.8VDC	6.3VAC	1.2VAC	0V	0V	-.8VDC		
V 13	6AV6	NOT USED IN ALL MODELS.								
V 14	6SN7GT	-16VDC	320VDC 120VDC	0V	-.2VDC	0V	0V	6.3VAC	0V	
V 15	6K6GT	0V	0V	340VDC	340VDC	0V	30VDC 0V	6.3VAC	45VDC 30VDC	
V 16	6SN7GT	-2.5VDC	115VDC	-22VDC	70VDC	195VDC	0V	0V	6.3VAC	
V 17	6BG6G	350VDC	6.3VAC	7.4VDC	0V	-22VDC	0V	0V	300VDC	TOP CAP *
V 18	6W4GT	0V	0V	480VDC	0V	355VDC	0V	480VDC	480VDC	
V 19	1B3GT	* DO NOT MEASURE								
V 20	5U4G	0V	360VDC	0V	360VAC	0V	360VAC	0V	360VDC	
V 21	19AP4A	0V	.4VDC	PIN 10 355VDC	PIN 11 110VDC	PIN 12 6.3VAC				

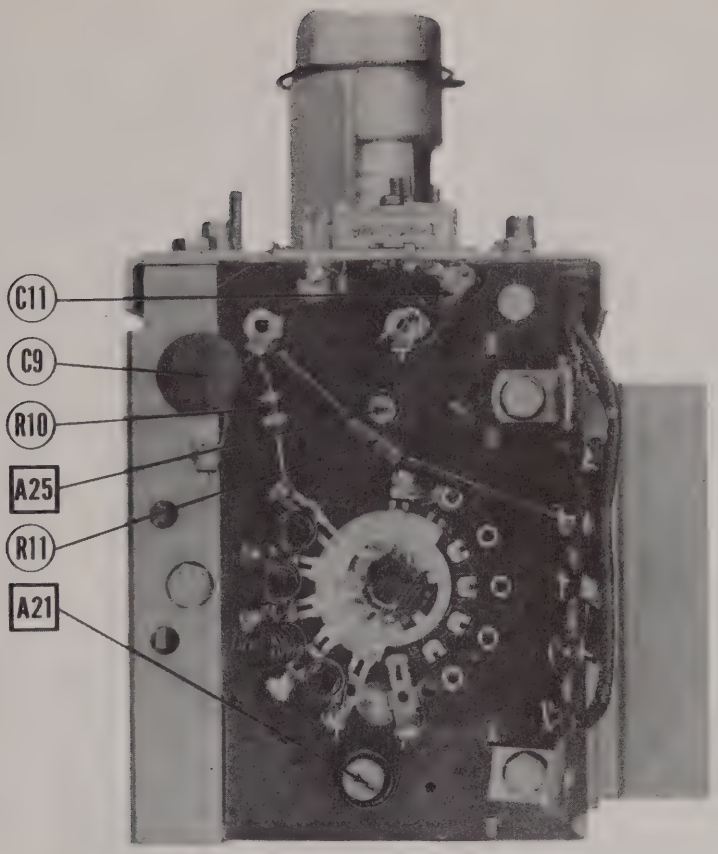
AGC SWITCH FULLY CLOCKWISE
§ TAKEN WITH VACUUM TUBE VOLTMETER
* DO NOT MEASURE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	80KΩ	27Ω	0Ω	.1Ω	†7KΩ	†30KΩ	0Ω		
V 2	6J6	†17KΩ	†7KΩ	0Ω	.1Ω	100KΩ	100KΩ	0Ω		
V 3	6AU6	35KΩ	0Ω	0Ω	.1Ω	†12KΩ	†37KΩ	120Ω		
V 4	6CB6	45KΩ	120Ω	.1Ω	0Ω	†17KΩ	†50KΩ	0Ω		
V 5	6AU6	35KΩ	0Ω	0Ω	.1Ω	†14KΩ	†37KΩ	82Ω		
V 6	6CB6	.1Ω	180Ω	.1Ω	0Ω	†13KΩ	†38KΩ	0Ω		
V 7	6AL5	.1Ω	33KΩ	0Ω	.1Ω	0Ω	0Ω	5.6KΩ		
V 8	12AU7	†32KΩ	5.6KΩ	3.7KΩ	.1Ω	.1Ω	†6.8KΩ	†600KΩ	†5KΩ	0Ω
V 9	12AU7	60KΩ	45KΩ	250KΩ	.1Ω	.1Ω	†14KΩ	60KΩ	2.2KΩ	0Ω
V 10	6AU6	470KΩ	0Ω	0Ω	.1Ω	†5.5KΩ	†5.5KΩ	82Ω		
V 11	6AU6	100KΩ	0Ω	0Ω	.1Ω	†5.5KΩ	†16KΩ	0Ω		
V 12	6AL5	0Ω	100KΩ	.1Ω	2.3Ω	200KΩ	0Ω	100KΩ		
V 13	6AV6	NOT USED IN ALL MODELS.								
V 14	6SN7GT	1.3 Meg.	†400KΩ †2.5Meg.	0Ω	70KΩ	0Ω	0Ω	.1Ω	0Ω	
V 15	6K6GT	Inf.	0Ω	†1.8KΩ	†1.8KΩ	2.2 Meg.	3.5KΩ 0Ω	.1Ω	5KΩ 1.5KΩ	
V 16	6SN7GT	1.5 Meg.	†60KΩ	410KΩ	480KΩ	†82KΩ	0Ω	0Ω	.1Ω	
V 17	6BG6G	†45Ω	.1Ω	100Ω	Inf.	1 Meg.	3.9KΩ	0Ω	†8.8KΩ †14KΩ	TOP CAP #25Ω
V 18	6W4GT	Inf.	Inf.	270KΩ	Inf.	†80Ω	Inf.	#0Ω	#.3Ω	
V 19	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #260Ω
V 20	5U4G	Inf.	7KΩ	Inf.	25Ω	Inf.	25Ω	Inf.	7KΩ	
V 21	19AP4A	0Ω	1 Meg.	PIN 10 †45Ω	PIN 11 150KΩ	PIN 12 .1Ω				

AGC SWITCH FULLY CLOCKWISE
† MEASURED FROM PIN 8 OF V20
# MEASURED FROM PIN 3 OF V18

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-REAR VIEW

DISASSEMBLY INSTRUCTIONS

TV CHASSIS REMOVAL

1. Remove seven push-on type control knobs.
2. Remove six screws holding rear cover in place. Remove rear cover.
3. Disconnect built-in antenna.
4. Disconnect speaker.
5. Disconnect audio lead.
6. Disconnect ground lead from picture tube.
7. Remove six 7/16" hex head bolts from chassis. Remove chassis.
8. Remove four 11/32" nuts from speaker. Remove speaker.

RADIO CHASSIS REMOVAL

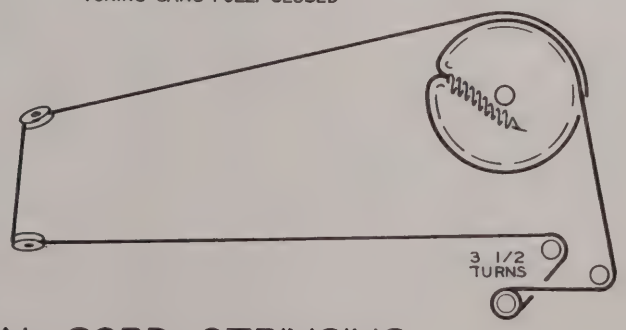
1. Remove five push-on type control knobs.
2. Disconnect built-in AM antenna.
3. Disconnect FM antenna.
4. Disconnect phono leads.
5. Remove wood screw at rear of track.
6. Remove three 1/4" hex head screws fastening rear cover.
7. Remove radio and 45RPM phonograph unit from rear of cabinet.

33 1/3-78 RPM PHONOGRAPH REMOVAL

1. Remove the fillister head machine screw at rear of 33 1/3 - 78 RPM phono track.
2. Remove from front of cabinet.

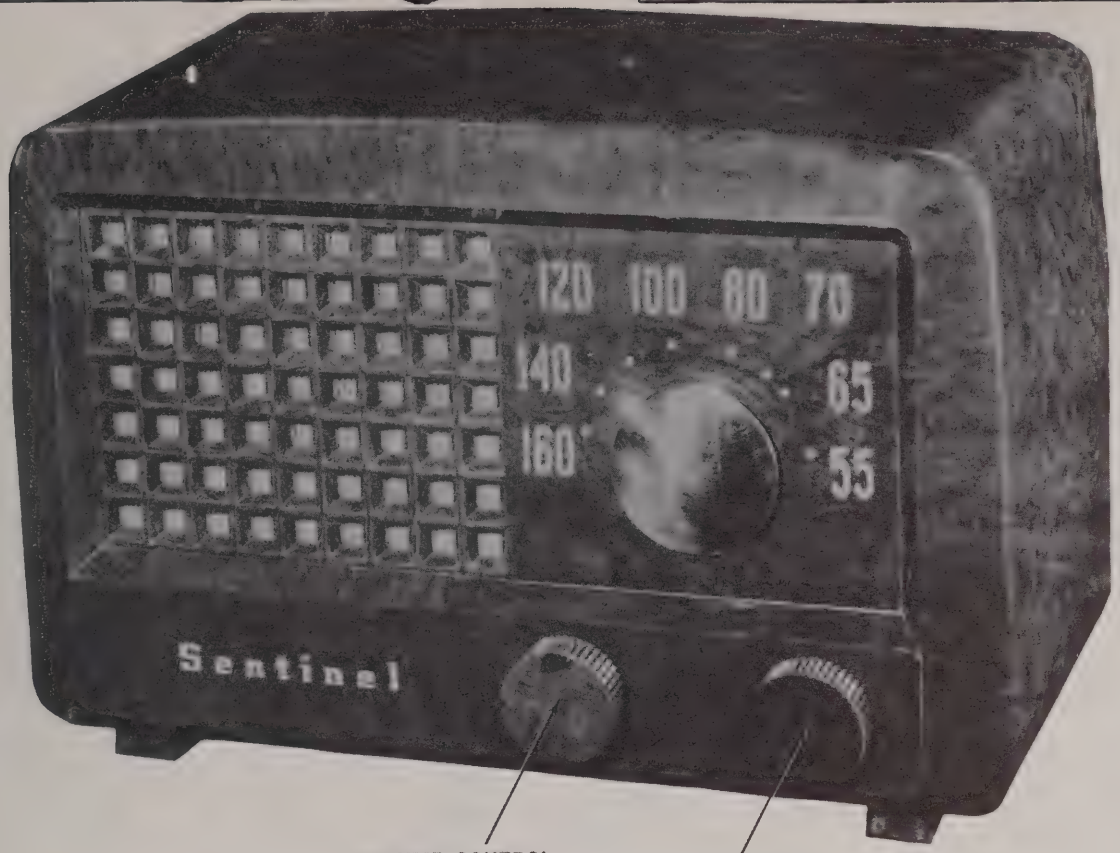
NOTE: FOR PICTURE TUBE REMOVAL, IT IS NECESSARY TO REMOVE THE TV CHASSIS AS OUTLINED ABOVE.

TUNING GANG FULLY CLOSED



DIAL CORD STRINGING

SENTINEL MODELS
1U-338-I, -R, -W, 338-I, -R, -W



VOLUME CONTROL
ON-OFF SWITCH

TUNING CONTROL

SENTINEL MODEL 338-W

TRADE NAME	Sentinel, Models 1U-338-I, -R, -W, 338-I, -R, -W
MANUFACTURER	Sentinel Radio Corp., 2100 W Dempster, Evanston, Illinois
TYPE SET	AC-DC Operated Superheterodyne Receiver With Loop Antenna
TUBES (FIVE)	Types 12BE6 Converter, 12BA6 IF Amp., 12AT6 Det.-AVC-AF, 50B5 Power Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC
RATING	.25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1650KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning cap fully closed and set pointer to last reference mark at low frequency end of dial.
Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.02MFD	High side to stator on rear section of tuning gang. Low side to B-.	455KC (400 ∿ Mod.)	Tuning gang fully open	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1650KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	"	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

SENTINEL MODEL 338-W

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SENTINEL PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amp.	12BA6	12BA6	7BK	
V3	Det.-AVC-AF	12AT6	12AT6	7BT	
V4	Power Output	50B5	50B5	7BZ	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SENTINEL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	50	150	25E24	PRS150/50-50		EDL5515		TVA-2453	Filter Yellow
B	50	150							Filter Red
C2	250		23E2027	S1250	D6-251	5W5T25	GP2K-250	1FM-325	RF Coupling *
C3	.05	200	23E216	P288-05	DF-503	PTE4S5		2TM-S5	AVC Filter
C4	250	500	23E42	1468-.00025	D6-251	5W5T25	GP2K-250	1FM-325	Diode RF Filter
C5	.01	200	23E211	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C6A	250		†	S1250	D6-251	5W5T25	GP2K-250	1FM-325	AF Amp. Plate
B	10000			BPD-01	DD-103	PTE4S1	821-01	36C1	Audio Coupling
C7	.01	400	23E411	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Output Plate Bypass
C8	.05	400	23E416	P488-05	DF-503	PTE4S5		4TM-S5	Line Filter
C9	.2	400	23E2021	P488-22		GT4P2		72P53	Line Isolation *

* Used Only In 1U338 Models.

† Items C6A, C6B, R6A, And R6B Are Combined Into One Unit. Mfgrs. Part No. 23E2041-2

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	500KΩ	½	28EZ7	Q13-133	AG-60-Z	BSK-60-S	Volume control
B	Shaft		Not req.	Not req.	KSS-3	Not req.	Attach to R1A per instructions
C	Switch		Not req.	76-1	SWB	Not req.	Attach to R1A per instructions

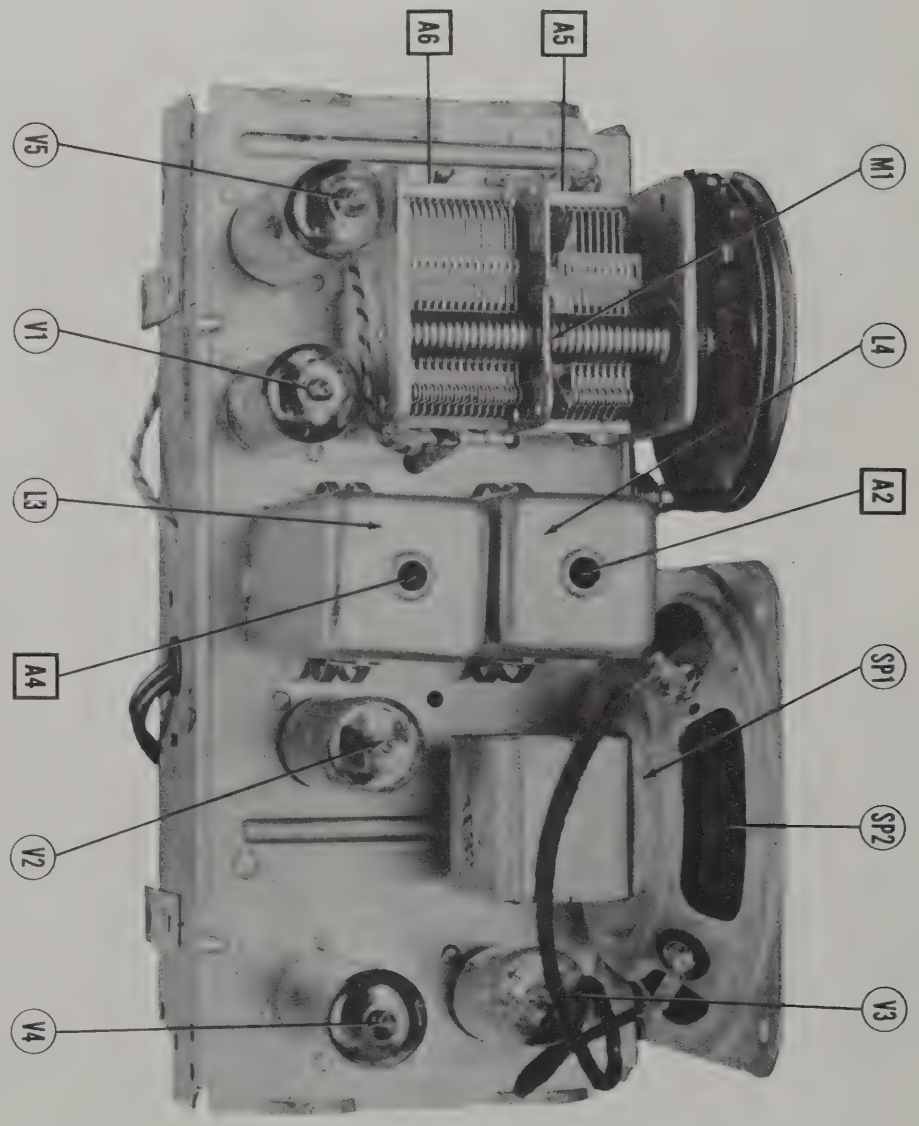
RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SENTINEL PART No.	IRC PART No.	IDENTIFICATION CODES
R2	1Meg	½	27E105		Converter Grid - See Note
R3	22KΩ	½	27E223		Mixer Grid
R4	3.3Meg	½	27E335	BTS-3.3Meg	AVC Network
R5	3.3Meg	½	27E335	BTS-3.3Meg	AF Amp. Grid
R6A	250KΩ	½	† 23E2041-2		AF Amp. Plate
B	500KΩ	½			Output Grid
R7	150Ω	½	27E151	BTS-150	Output Cathode
R8	2200Ω	1	27E222-3	BTA-2200	Filter

† Items R6A, R6B, C6A, And C6B Are Combined Into One Unit.

Note: Used Only In Model 1U338.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	3KΩ	3Ω	180Ω	.4Ω	22E49	A-3025	A-3025	RO-2 ①	① Drill one new mtg. hole

SPEAKER

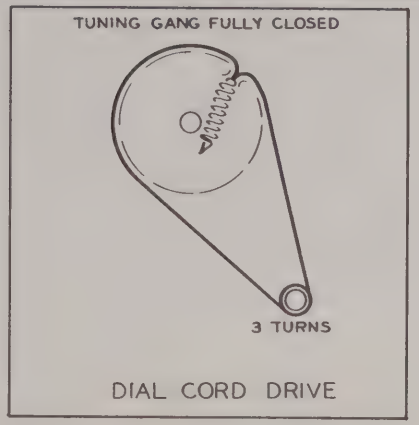
ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			SENTINEL PART No.	VIKING PART No.	QUAM PART No.	
	FIELD	V. C. IMP.				
SP1	PM	3Ω	1E32	35J4	3A07	
	CONE DIA.	V. C. DIA.				
SP2	3 1/2"	9/16"				

R F COILS

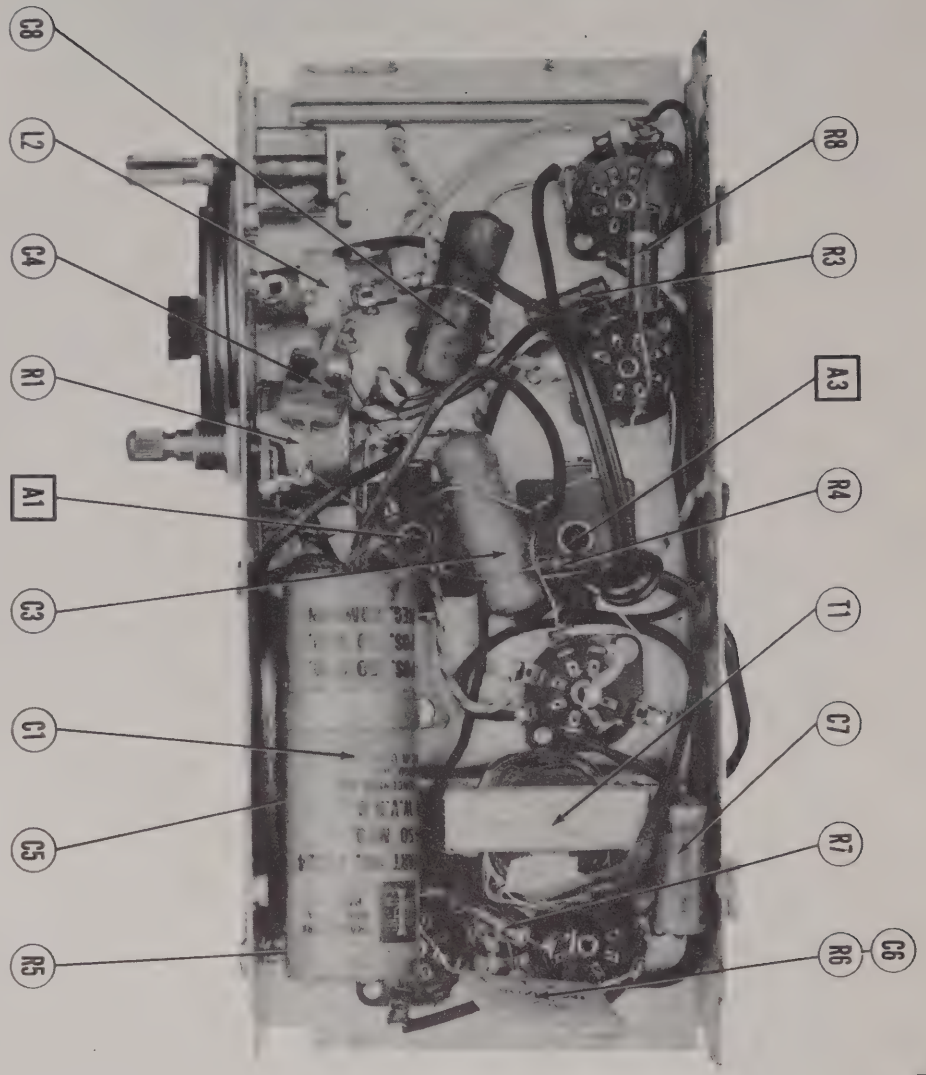
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	
L1	Loop Antenna	3.2Ω		64E33		Includes Cabinet Back
L2 A	Osc. Coil	1.2Ω	9.5Ω	20E333		
B	Osc. Coil	1Ω	8.8Ω	20E346		Model 1U338 Only
L3	1st IF	19Ω	19Ω	20E402		
L4	2nd IF	19Ω	19Ω	20E402		

MISCELLANEOUS

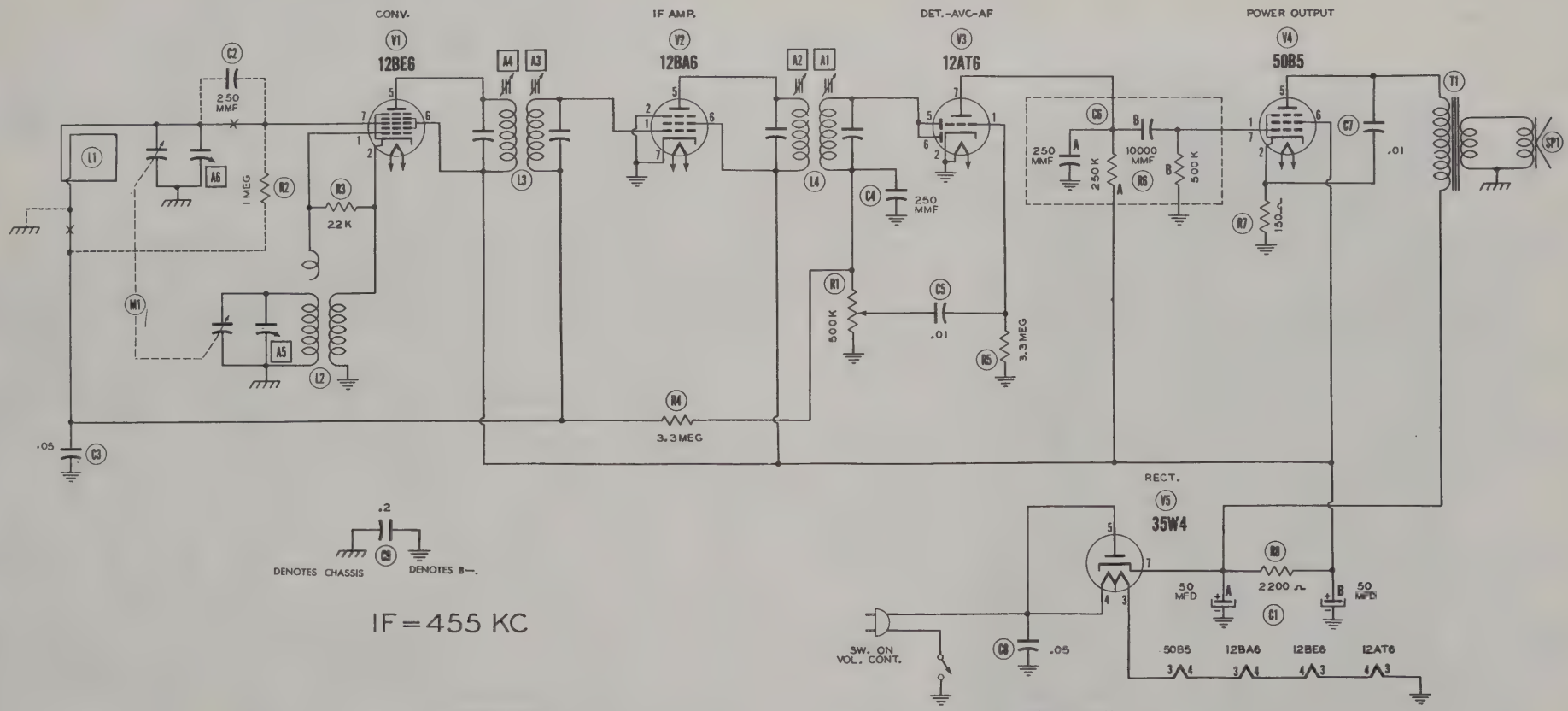
ITEM No.	PART NAME	SENTINEL PART No.	NOTES
M1	2 Gang Var. Cap	24E45	(30-450MMF, 22-159MMF)
	Cabinet	7E248	Walnut
	Cabinet	7E248-2	Ivory
	Cabinet	7E248-3	Red
	Dial Pointer	35E29	
	Knob	37E52-15	Walnut Cabinet
	Knob	37E52-16	Ivory And Red Cabinets



CHASSIS—BOTTOM VIEW



SENTINEL MODEL 338-W



IF = 455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	§-5.5VDC	0V	12VAC	25VAC	80VDC	80VDC	-.5VDC
V 2	12BA6	-.5VDC	0V	36VAC	25VAC	80VDC	80VDC	0V
V 3	12AT6	-.6VDC	0V	0V	12VAC	-.5VDC	-.5VDC	40VDC
V 4	50B5	0V	5.6VDC	85VAC	36VAC	120VDC	80VDC	0V
V 5	35W4	0V	0V	85VAC	117VAC	117VAC	110VAC	130VDC

§ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1.2Ω	13Ω	25Ω	†2.2KΩ	†2.2KΩ	3.8 Meg.
V 2	12BA6	3.8 Meg.	0Ω	36Ω	25Ω	†2.2KΩ	†2.2KΩ	0Ω
V 3	12AT6	3.3 Meg.	0Ω	0Ω	13Ω	500KΩ	500KΩ	†250KΩ
V 4	50B5	500KΩ	150Ω	85Ω	36Ω	†180Ω	†2.2KΩ	500KΩ
V 5	35W4	Inf.	Inf.	85Ω	120Ω	120Ω	110Ω	70KΩ

† MEASURED FROM PIN 7 OF V5

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCEHMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SONOGRAPH
MODEL BL100

SONOGRAPH
MODEL BL100

SONOGRAPH MODEL BL100

TRADE NAME	Sonograph, Model BL100
MANUFACTURER	Pentron Corp., 221 E. Cullerton, Chicago, Illinois
TYPE SET	AC Operated Wire Recorder And Audio Amplifier
TUBES (FOUR)	Types 6J7 Mic. Pre-Amp., 6SN7GT AF Amp., 6V6GT Power Output, 6X4 Rectifier
POWER SUPPLY	110-120 Volts AC RATING .41 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON MECHANICAL UNIT SEE CRESCENT SERIES M2000 AND M3000 IN PHOTOFACT SET No. 120, FOLDER No. 4

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: SONOGRAPH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Mic. Pre-Amp.	6J7	6J7	7R	
V2	AF Amp.	6SN7GT	6SN7GT	8BD	
V3	Bias Osc.-Power Output	6V6GT	6V6GT	7AC	
V4	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: SONOGRAPH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	30	350		AF666J		UP43245		TVL-3782	• Filter
B	30	350							■ Filter
C	30	350							▲ Filter
C2	.01	400		P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C3	.05	400		P488-05	DF-503	PTE4S5		4TM-S5	Pre-Amp. Screen
C4	.01	400		P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C5	.01	400		P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C6	1000	500		1467-001	D6-102	1W5D1	GP2L-001	1FM-21	Tone Comp.
C7	.01	400		P488-05	DF-503	PTE4S5		4TM-S5	Audio Coupling
C8	1000	500		1467-001	D6-102	1W5D1	GP2L-001	1FM-21	Tone Comp.
C9	.01	400		P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C10	2000	500		1467-002	D6-202	1W5D2	GP2M-002	1FM-22	Fixed Trimmer
C11	.003	600		P688-003	D6-302	PTE6D3	GP2M-003	6TM-D3	Osc. Feedback
C12	.1	400		P488-1	DF-104	PTE4P1		4TM-P1	Relay Bypass

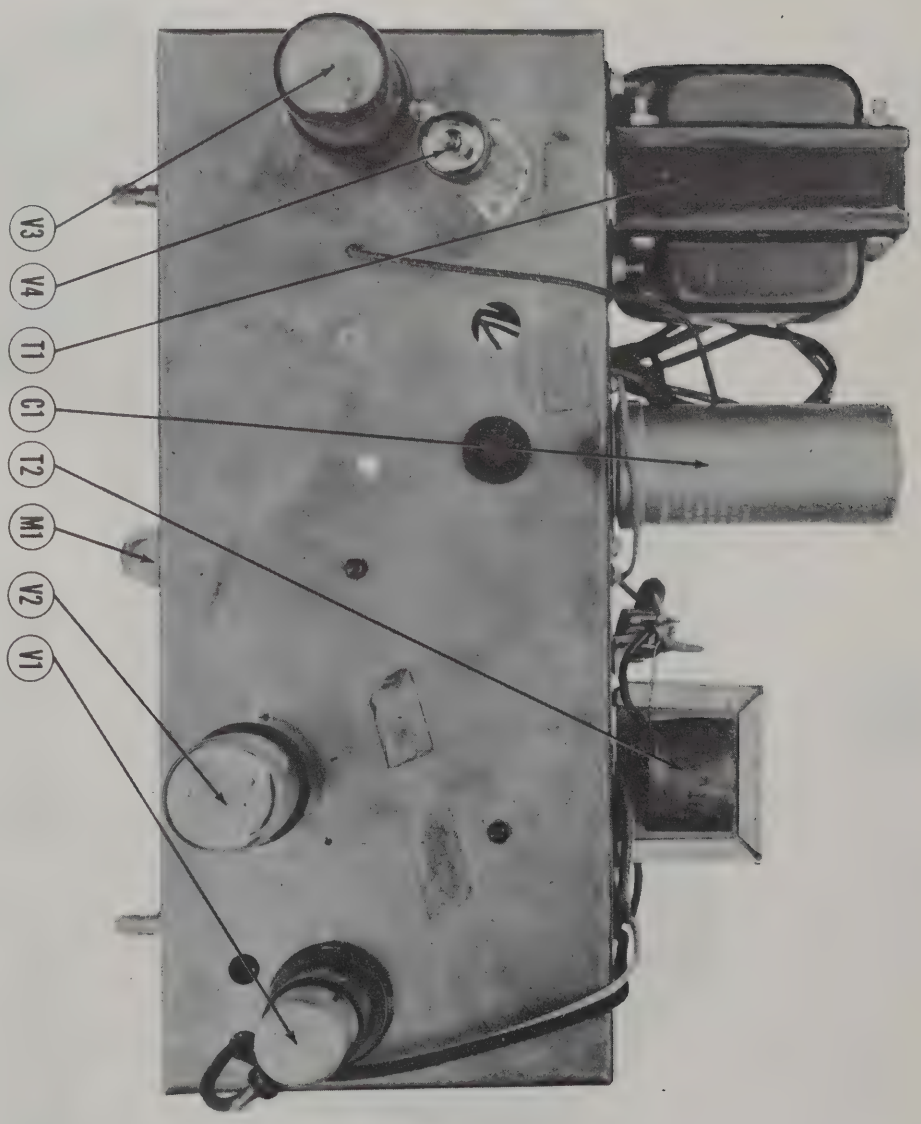
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SONOGRAPH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	1Meg	½		Q13-137	AG-63-S	BSK-70-S	Volume control
B	Shaft			Not req.	KSS-3	Not req.	Attach to R1A per instructions
C	Switch			76-1	SWB	Not req.	Attach to R1A per instruction

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: SONOGRAPH PART No.	IRC PART No.	IDENTIFICATION CODES
R2	22KΩ	½		BTS-22K	Tone Compensation
R3	100KΩ	½		BTS-100K	Tone Compensation
R4	4.7Meg	½		BTS-4.7Meg	Pre-Amp. Grid
R5	2Meg	½		BTS-2.2Meg	Pre-Amp. Screen
R6	470KΩ	½		BTS-470K	Pre- Amp. Plate
R7	470KΩ	½		BTS-470K	1st AF Amp. Grid
R8	1500Ω	½		BTS-1500	1st AF Amp. Cathode
R9	47KΩ	½		BTS-47K	1st AF Amp. Plate
R10	1500Ω	½		BTS-1500	2nd AF Amp. Cathode
R11	47KΩ	½		BTS-47K	2nd AF Amp. Plate
R12	47KΩ	½		BTS-47K	Tone Compensation
R13	100KΩ	½		BTS-100K	Output Grid
R14	4700Ω	½		BTS-4700	Output Grid
R15	500Ω	1			Output Cathode
R16	47KΩ	½		BTS-47K	Series Neon
R17	4.7Ω	2		BW-½-4.7	Voice Coil Shunt - Wire Wound
R18	1Meg	½		BTS-1Meg	Indicator Network
R19	220KΩ	½		BTS-220K	Voltage Divider
R20	180KΩ	½		BTS-180K	Neon Load
R21	100KΩ	½		BTS-100K	Neon Load
R22	47KΩ	1		BTA-47K	Filter
R23	4700Ω	2		BTB-4700	Filter

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	SONOGRAPH PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .41A	600VCT .05ADC	5VAC @ 2A	6.3VAC @ 2.7A		PC 8407 ①	P3160 ①	PV-70A

① Add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		SONOGRAPH PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	4.8KΩ	3.2Ω	245Ω	1.3Ω		A-3877 ②	A3019	RO-9 ②	② Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
	FIELD	V. C. IMP.	SONOGRAPH PART No.	JENSEN PART No.	QUAM PART No.	
SP1	PM	3.2Ω				
	CONE DIA.	V. C. DIA.				
SP2	2 7/8"	9/16"				

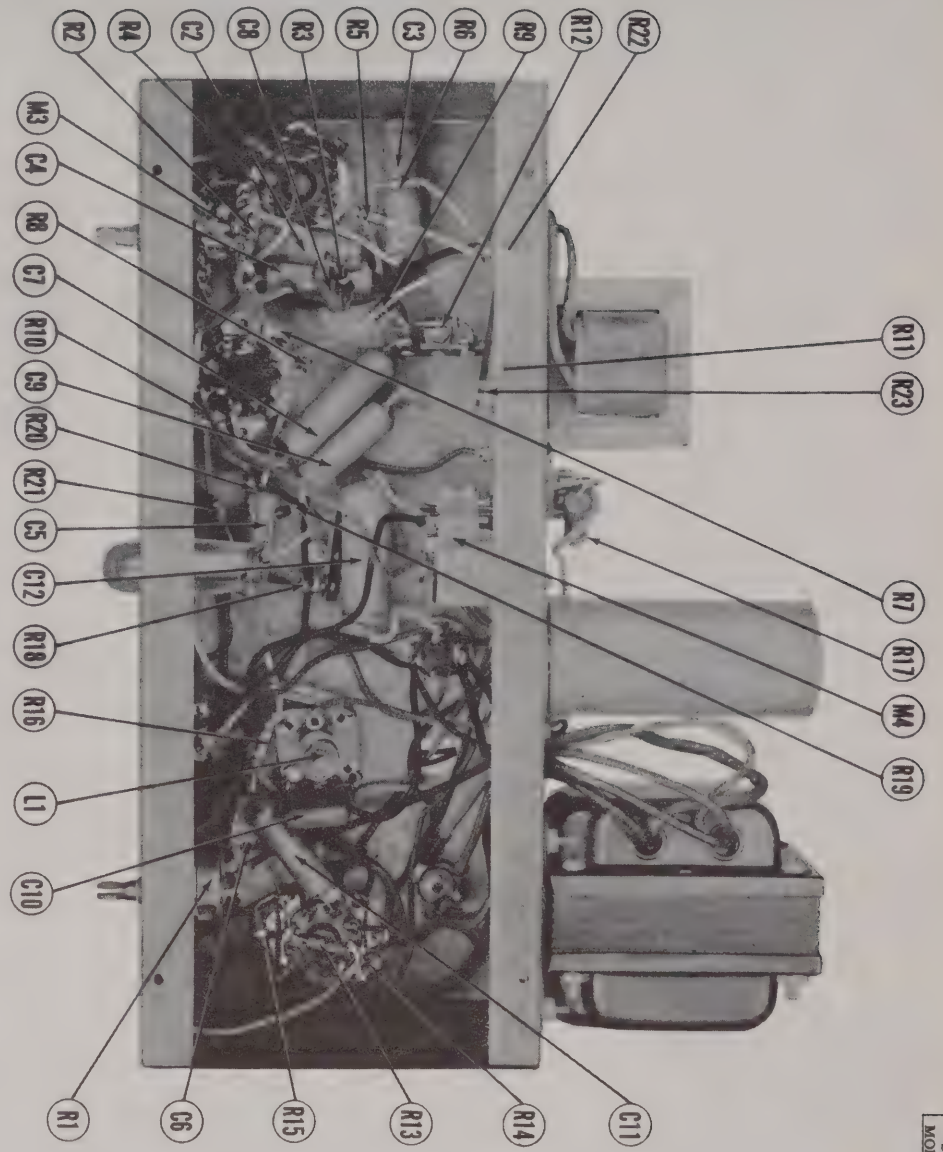
R F COILS

ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	SONOGRAPH PART No.	MEISSNER PART No.	
L1	Bias Osc. Coil	.1Ω		32Ω		Secondary tapped at 4Ω

MISCELLANEOUS

ITEM No.	PART NAME	SONOGRAPH PART No.	NOTES
M1	Neon Lamp		
M2	Neon Lamp		
M3	Switch		Rewind-Play-Record
M4	Relay		

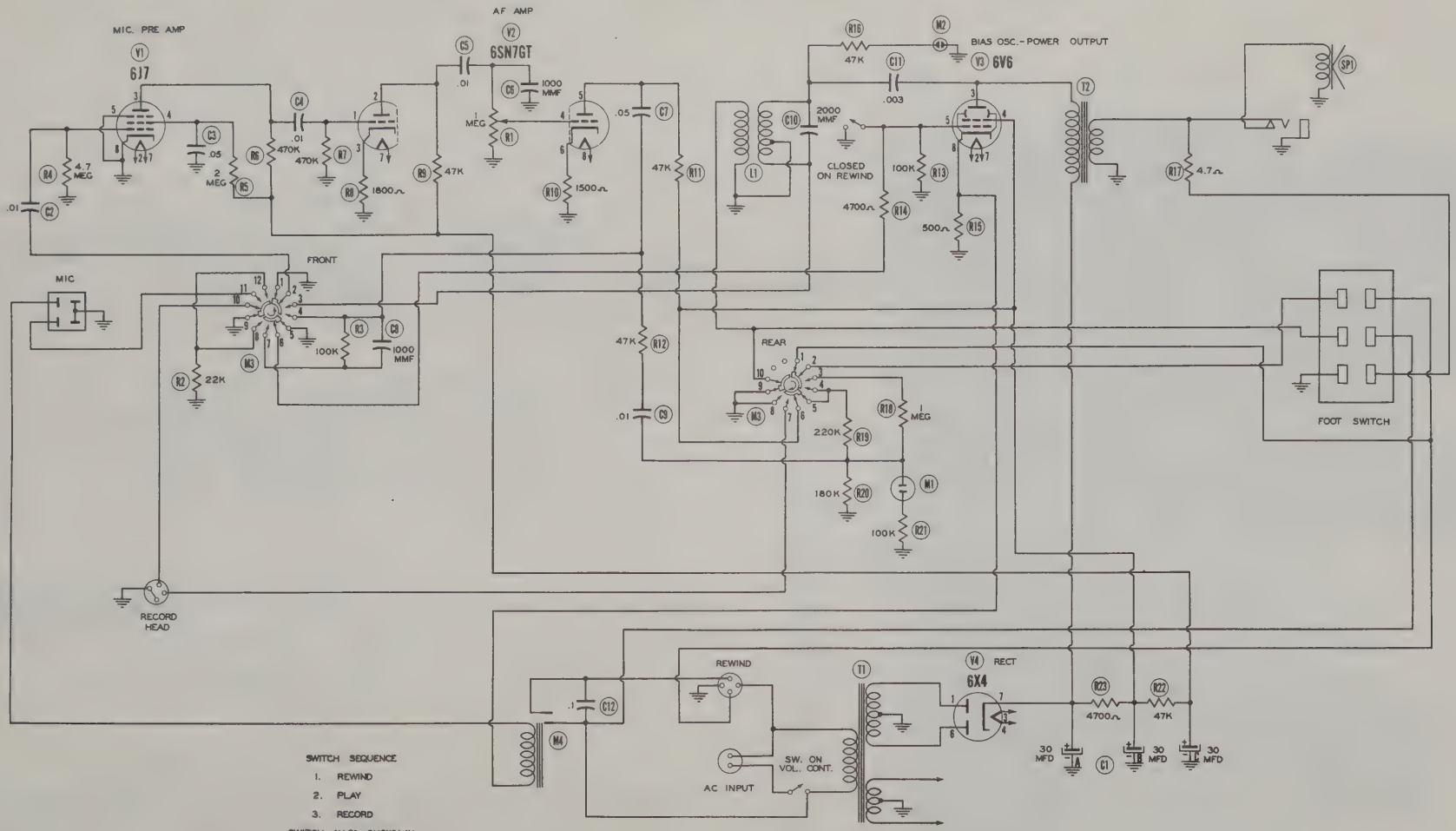
CHASSIS—BOTTOM VIEW



SET 122 FOLDER 10

SONOGRAPH MODEL BL100

SONOGRAPH MODEL BL100



SWITCH SEQUENCE

1. REWIND
2. PLAY
3. RECORD

SWITCH (M3) SHOWN IN REWIND POSITION

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J7	0V	¶	▲◆20VDC ◆30VDC	▲◆16VDC ◆18VDC	0V	-.7VDC	¶	0V	-.7VDC
V 2	6SN7GT	▲◆0V ◆-5.4VDC	65VDC	2.8VDC	0V	▲◆130VDC ◆115VDC	▲◆5VDC ◆4.6VDC	¶	¶	
V 3	6V6GT	0V	¶	315VDC	▲◆280VDC ◆260VDC	▲◆ 0V ◆-1.7VDC	▲◆ 0V	¶	18VDC	
V 4	6X4GT	280VAC	0V	¶	¶	0V	280VAC	320VDC		

¶ 6.3VAC MEASURED ACROSS FILAMENTS

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6J7	0Ω	.1Ω	†520KΩ	†2Meg	0Ω	4.7Meg	.1Ω	0Ω	4.7Meg
V 2	6SN7GT	◆70KΩ	◆100KΩ	1.5KΩ	0Ω	†50KΩ	1.5KΩ	.1Ω	.1Ω	
V 3	6V6GT	0Ω	.1Ω	†245Ω	†4.7KΩ	▲◆4.7KΩ ◆100KΩ	▲0Ω ◆4Ω ◆100KΩ	.1Ω	500Ω	
V 4	6X4GT	300Ω	Inf.	.1Ω	.1Ω	Inf.	300Ω	35KΩ		

† MEASURED FROM PIN 7 OF V4

▲ TAKEN IN REWIND POSITION
◆ TAKEN IN PLAY POSITION
• TAKEN IN RECORD POSITION

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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122-10

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

WESTINGHOUSE MODELS
H-633C17, H-634C17
(CH. V-2173)

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MODEL H-633C17

WESTINGHOUSE MODELS
H-633C17, H-634C17
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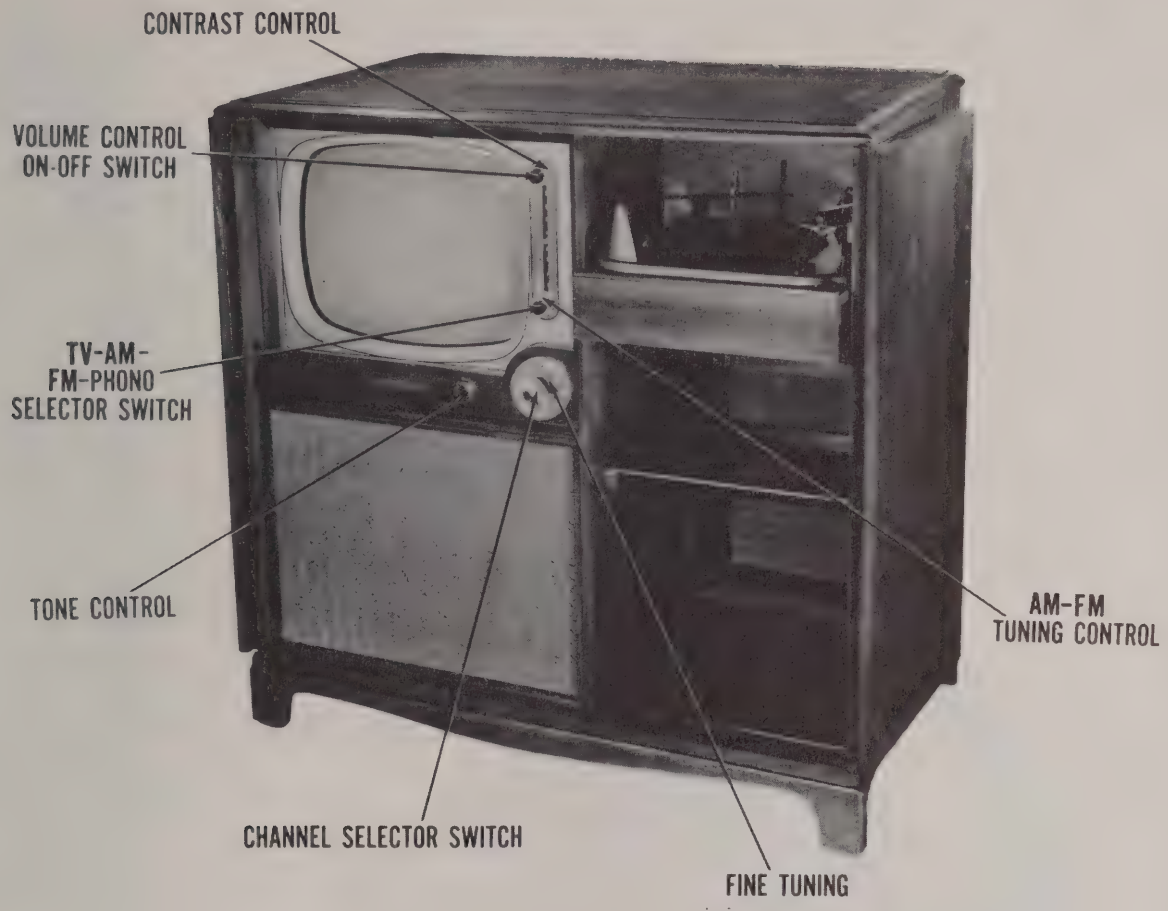

WESTINGHOUSE MODELS
H-633C17, H-634C17 (Ch. V-2173)

WESTINGHOUSE MODEL H-633C17

TRADE NAME	Westinghouse Models H-633C17, H-634C17 (Ch. V-2173)
MANUFACTURER	Westinghouse Elect. Corp., Home Radio Div., Sunbury, Pa.
TYPE SET	TV-AM-FM-Phono Combination Receiver.
TUBES	Twenty Seven
POWER SUPPLY	110-120 Volts AC-60Cycle
RATING	1.25 Amp. @ 117 Volts AC
TUNING RANGE—Channels 2 thru 13	

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FOR SERVICE INFORMATION ON RECORD CHANGER UNIT V-9840 - SEE SIMILAR VM MODEL 950 PHOTOFACT SET #107 FOLDER 13 OR RECORD CHANGER MANUAL CM-3.

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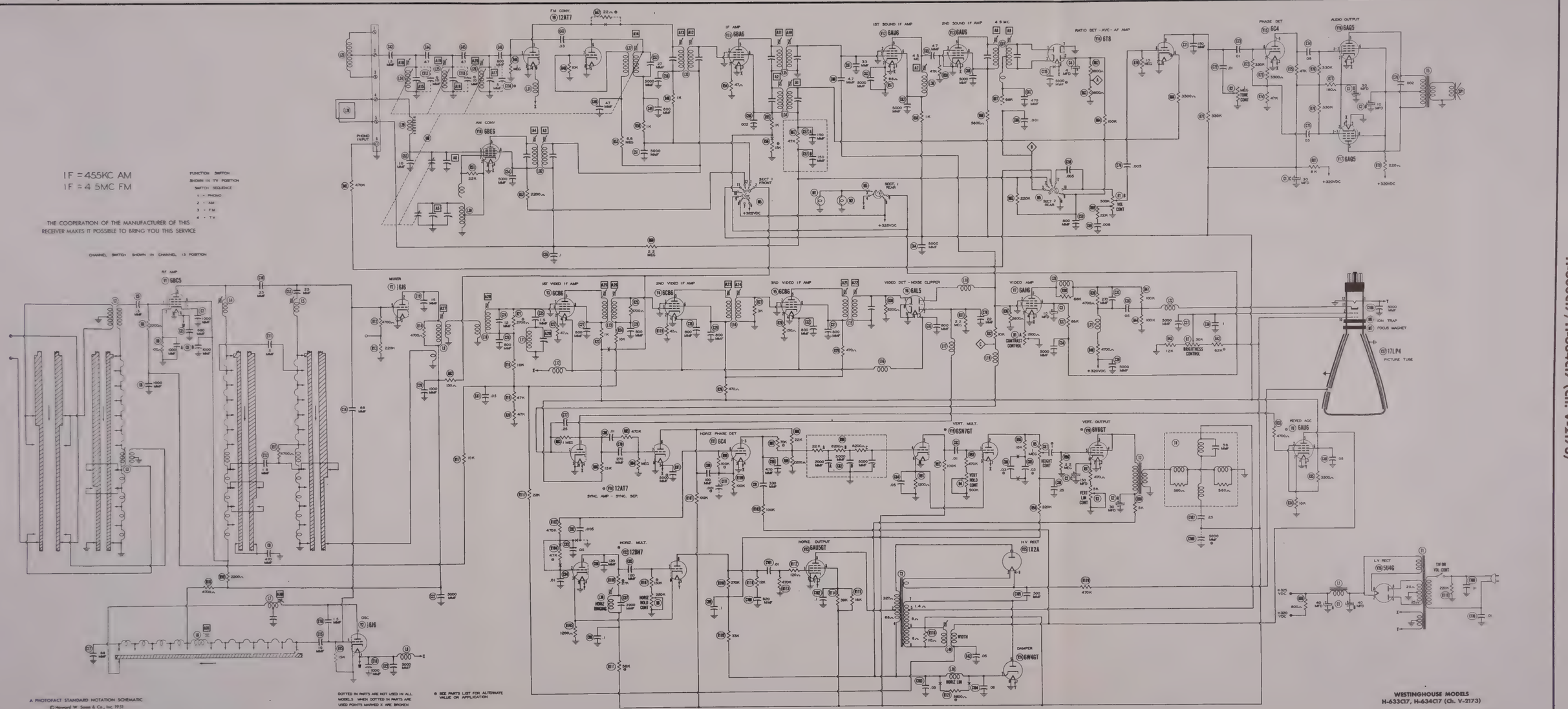
IF = 455KC AM
IF = 4.5MC FM
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
FUNCTION SWITCH
SHOWN IN TV POSITION
SWITCH SEQUENCE
1 - PHONO
2 - AM
3 - FM
4 - TV
CHANNEL SWITCH SHOWN IN CHANNEL 13 POSITION
FM CONV. V8 12AT7
AM CONV. V9 6BE6
IF AMP V11 6BA6
1ST SOUND IF AMP V12 6AU6
2ND SOUND IF AMP V13 6AU6
4.5 MC
RATIO DET - AVC - AF AMP V14 6T8
PHASE DET V15 6C4
AUDIO OUTPUT V16 6AQ5
PHONO INPUT
SECT 1 FRONT
SECT 1 REAR
SECT 2 REAR
VOL CONT
TONE CONT
RF AMP V1 6BC5
MIXER V2 6J6
OSC V3 6J6
1ST VIDEO IF AMP V4 6CB6
2ND VIDEO IF AMP V5 6CB6
3RD VIDEO IF AMP V6 6CB6
VIDEO DET - NOISE CLIPPER V7 6AL5
VIDEO AMP V8 6AV6
CONTRAST CONTROL
BRIGHTNESS CONTROL
ION TRAP
FOCUS MAGNET
V17 17LP4
PICTURE TUBE
SYNC AMP - SYNC SEP. V10 12AT7
HORIZ PHASE DET V17 6C4
VERT. MULT. V18 6SN7GT
VERT. OUTPUT V19 6V6GT
VERT HOLD CONT
VERT LIN CONT
KEYED AGC V18 6AU6
HORIZ. MULT. V20 12BH7
HORIZ HOLD CONT
HORIZ LIN
HORIZ. OUTPUT V21 6AU5GT
H.V. RECT V22 1X2A
WIDTH
DAMPER V23 6W4GT
L.V. RECT V24 5U4G
TRAP ON VOL CONT
+320VDC
+325VDC
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DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN
* SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
WESTINGHOUSE MODELS
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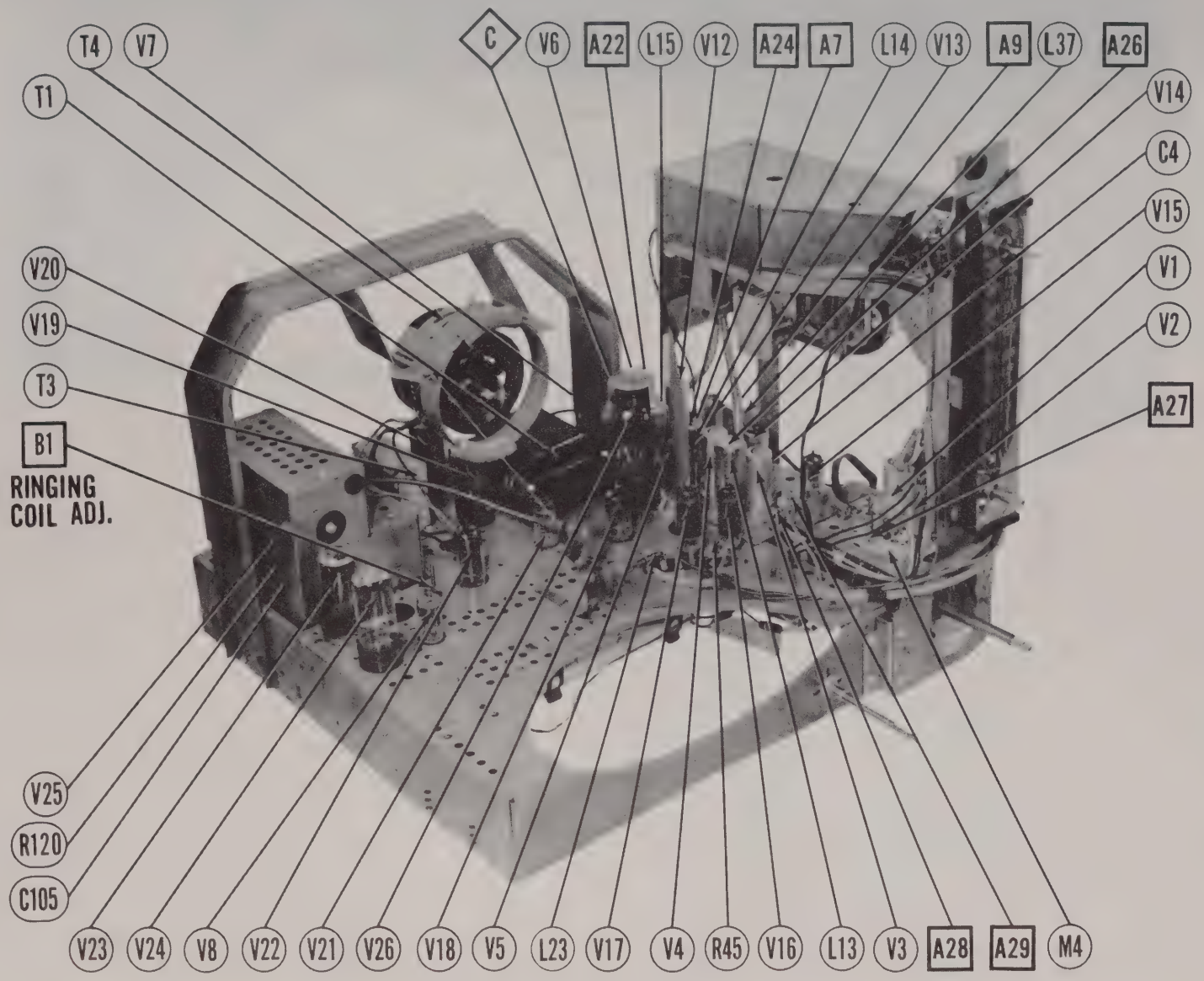
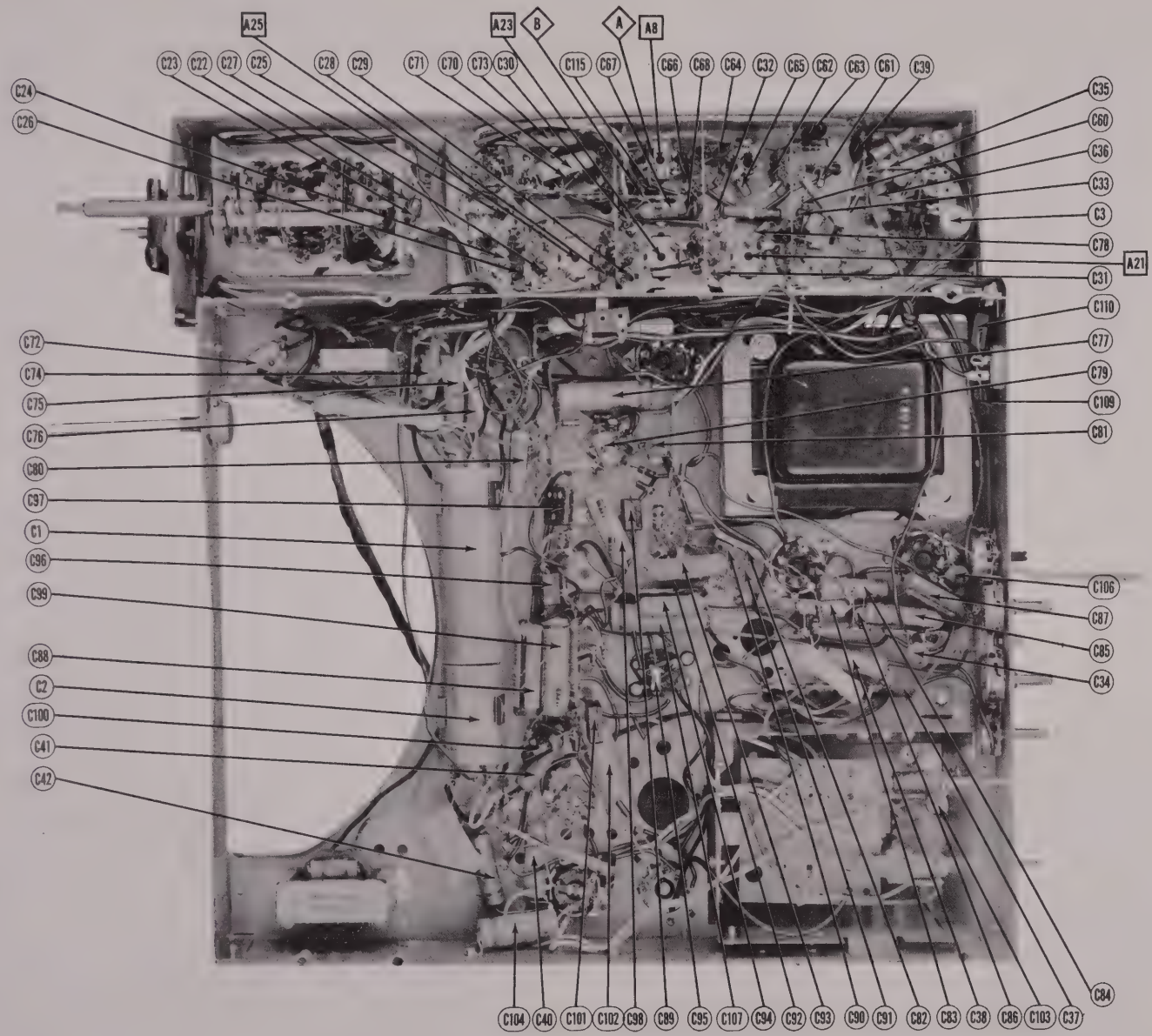
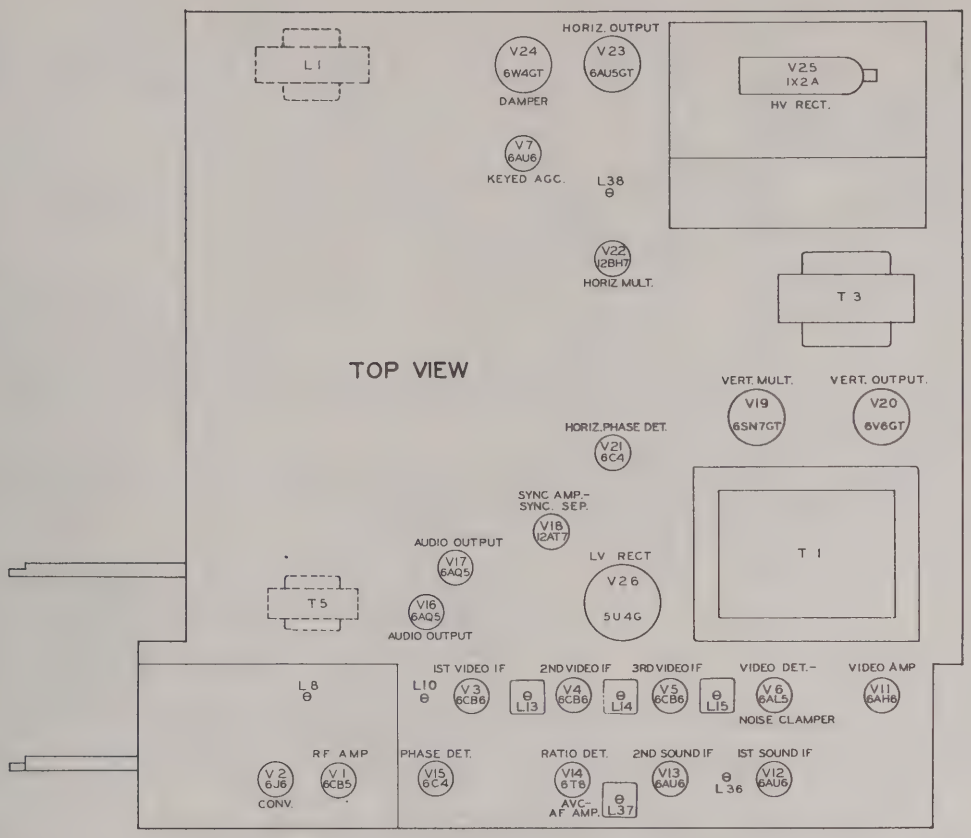
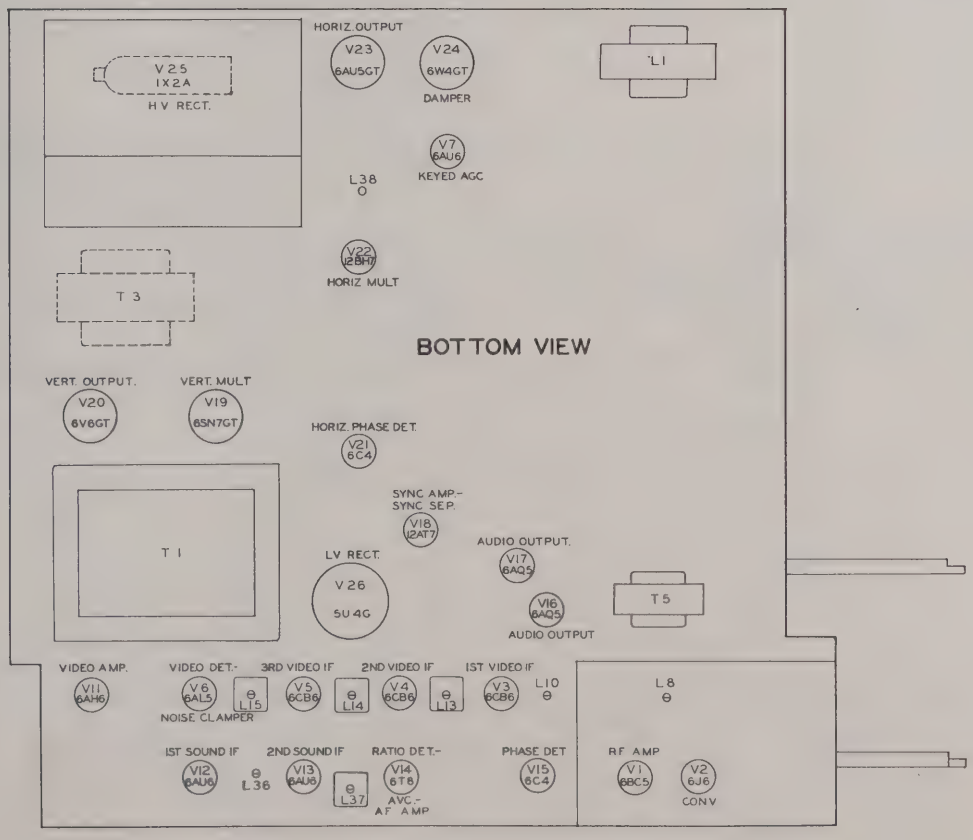


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The end of the high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube to eliminate the high voltage.

To set the radio dial pointer, turn the tuning gang fully closed and set the pointer even with the bottom of the fives at the low frequency end of the AM dial.

AM RADIO ALIGNMENT

Turn the function selector switch to "AM".
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to stator on rear section on tuning gang. Low side to chassis.	455KC (400 ∿ Mod.)	AM (second position CW)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	.1MFD	"	1615KC	"	"	"	A5	"
3.		Loop	1400KC	"	Tune for max. output	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

FM AND TV SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

If AM alignment is required it should be performed before FM alignment.
Turn the function selector to "FM".

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V12). Low side to chassis.	4.5MC (Unmod.)	FM (third position CW)	Tuning gang fully open	DC Probe to Point (A). Common to chassis.	A7, A8	Adjust for maximum deflection.
5.	.001MFD	"	"	"	"	DC Probe to Point (B). Common to Point (A).	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	.001MFD	High side to ungrounded tube shield floating over converter tube (V9). Low side to chassis.	"	"	"	DC Probe to Point (A). Common to chassis.	A10, A11, A12, A13	Adjust for maximum deflection. Continue with step 8.

FM AND TV SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

See instructions under VTVM alignment.
Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.001MFD	High side to pin 1 (Grid) of 6AU6 (V12). Low side to chassis.	4.5MC (450KC SWP)	FM (third position CW)	Point of non-interference	Vert. Amp. to Point (A). Low side to chassis.	A7, A8	Disconnect stabilizer capacitor C4. Adjust for maximum amplitude and symmetry as per figure 1.
5.	.001MFD	High side to pin 1 (Grid) of 6BA6 (V11). Low side to chassis.	"	"	"	"	A10, A11	"
6.	.001MFD	High side to pin 2 (Grid) of 12AT7 (V9). Low side to chassis.	"	"	"	"	A12, A13	"
7.	.001MFD	"	"	"	"	Vert. Amp. to Point (B). Low side to chassis.	A9	Reconnect capacitor C4. Adjust A9 so 4.5MC occurs at center of crossover lines as per figure 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	300Ω carbon res.	High side thru 300Ω to antenna terminal 3. Low side to chassis.	98MC (Unmod.)	FM	98MC	DC Probe to Point (A). Common to chassis.	A14	Adjust for maximum deflection.
9.	"	"	90MC	"	Tune for max. deflection.	"	A15, A16, A17	Rock tuning while adjusting for maximum deflection.
10.	"	"	105MC	"	"	"	A18, A19, A20	"

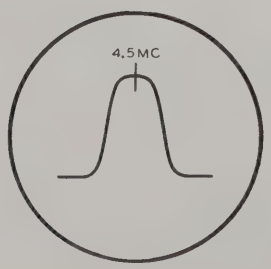


FIG. 1

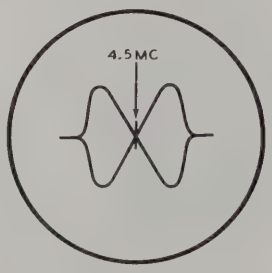


FIG. 2

ALIGNMENT INSTRUCTIONS (CONT.)

VIDEO IF ALIGNMENT

Remove the converter tube and replace it with a 6J6 which has pin 1 removed, this will disable the local oscillator and prevent erroneous indications.
Remove the RF amplifier tube (V1) from its socket.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	.001MFD	High side to pin 1 (Grid) of 6CB6 (V5). Low side to chassis.	44MC (10MC SWP)	42.25MC 43MC 45MC 45.75MC	Any	Vert. Amp. to Point C. Low side to chassis.	A21, A22	Connect a 100MMFD capacitor from pin 5 of V4 to chassis. Adjust A21 for maximum amplitude of response curve. Adjust A22 for symmetrical response similar to figure 3. Remove the detuning capacitor.
12.	.001MFD	High side to pin 1 (Grid) of 6CB6 (V4). Low side to chassis.	"	"	"	"	A23, A24	Connect the 100MMFD capacitor from pin 5 of V3 to chassis. Adjust A23 for maximum amplitude of response curve. Adjust A24 for symmetrical response similar to figure 4. Remove the detuning capacitor.
13.	.001MFD	High side to pin 1 (Grid) of 6CB6 (V3). Low side to chassis.	"	"	"	"	A25, A26	Short the link connecting L8 and L10. Adjust A25 for maximum amplitude of response . Adjust A26 for symmetrical response similar to figure 5. Remove link short.
14.	Direct	High side to ungrounded tube shield floating over dummy converter tube (V2). Low side to chassis.	"	44MC	"	"	A27, A28	Turn A29 to maximum clockwise. Adjust A27 for maximum amplitude of response. Adjust A28 for symmetrical response similar to figure 6. Check to see that 44MC marker appears at center of top portion of curve.
15.	Direct	"	"	41.25MC	"	"	A29	Adjust for MINIMUM marker indication at the 41.25MC point on response curve.
16.	Direct	"	"	41.25MC 42.25MC 43MC 45MC 45.75MC	"	"	A27, A28	If necessary readjust A27 and A28 for response curve similar to figure 7 with markers as shown.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
Replace the RF amplifier tube in its socket.
Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Direct	High side to either a antenna terminal. Low side to chassis.	213MC (10MC SWP)	211.25MC 215.75MC	13	Vert. Amp. to Point C. Low side to chassis.	A30	Adjust to place sound marker in "notch" as per figure 8. The video marker should be at 50%.
18.	Direct	"	207MC (10MC SWP)	205.25MC 209.75MC	12	"		Check to see that the sound marker can be properly placed well within the range of the fine tuning control. If not compromise adjustment of A30 may be required.
			201MC (10MC SWP)	199.25MC 203.75MC	11			
			195MC (10MC SWP)	193.25MC 197.75MC	10			
			189MC (10MC SWP)	187.25MC 191.75MC	9			
			183MC (10MC SWP)	181.25MC 185.75MC	8			
			177MC (10MC SWP)	175.25MC 179.75MC	7			
19.	Direct	"	85MC (10MC SWP)	83.25MC 87.75MC	6	"	A31	Adjust to place sound marker in "notch" as shown in figure 8. The video marker should be at 50%.
20.	Direct	"	79MC (10MC SWP)	77.25MC 81.75MC	5	"		Check to see that the sound marker can be properly placed well within the range of the fine tuning control. If not compromise adjustment of A31 may be required.
			69MC (10MC SWP)	67.25MC 71.75MC	4			
			63MC (10MC SWP)	61.25MC 65.75MC	3			
			57MC (10MC SWP)	55.25MC 59.75MC	2			

THE RF AND MIXER PORTION OF THIS RECEIVER HAS BEEN PROPERLY ALIGNED AT THE FACTORY AND IS VERY STABLE . ALIGNMENT OF THIS PORTION SHOULD NOT BE REQUIRED IN THE FIELD.

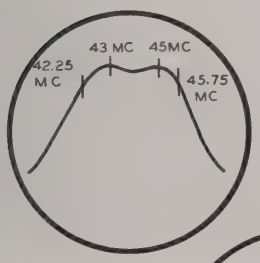


FIG.3

FIG.4

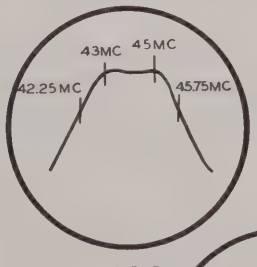


FIG.5

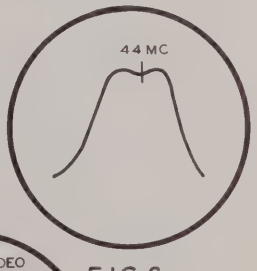


FIG.6

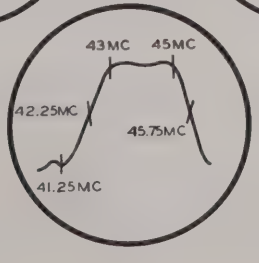


FIG.7

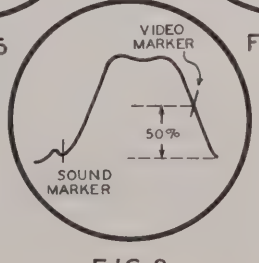


FIG.8

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	0V	1VDC	0V	6.3VAC	95VDC	95VDC	1VDC		
V 2	6J6	80VDC	110VDC	0V	6.3VAC	-2.6VDC	§-5.2VDC	0V		
V 3	6CB6	0V	.4VDC	6.3VAC	0V	100VDC	100VDC	0V		
V 4	6CB6	0V	.8VDC	6.3VAC	0V	105VDC	105VDC	0V		
V 5	6CB6	0V	1.2VDC	6.3VAC	0V	100VDC	100VDC	0V		
V 6	6AL5	0V	-.6VDC	6.3VAC	0V	0V	0V	-.4VDC		
V 7	6AH6	-.4VDC	0V	6.3VAC	0V	285VDC	260VDC	6.6VDC		
V 8	6AU6	45VDC	85VDC	6.3VAC	0V	0V	115VDC	85VDC		
V 9	12AT7	† 110VDC	† -1VDC	0V	0V	0V	† 110VDC	†§-8.6VDC	0V	6.3VAC
V 10	6BE6	▲§-6.8VDC	0V	0V	6.3VAC	▲ 90VDC	▲ 90VDC	▲-.3VDC		
V 11	6BA6	†-.5VDC ▲-.3VDC	0V	6.3VAC	0V	†110VDC ▲100VDC	†110VDC ▲100VDC	† .2VDC ▲.6VDC		
V 12	6AU6	0V	0V	6.3VAC	0V	100VDC	100VDC	.8VDC		
V 13	6AU6	-.6VDC	0V	6.3VAC	0V	70VDC	70VDC	0V		
V 14	6T8	-1VDC	-3.8VDC	-1VDC	6.3VDC	0V	▲-1VDC	0V	-1VDC	55VDC
V 15	6C4	80VDC	35VDC	6.3VAC	0V	80VDC	4VDC	35VDC		
V 16	6AQ5	# 0V	#12VDC	6.3VAC	0V	#185VDC	#190VDC	#0V		
V 17	6AQ5	#0V	#12VDC	0V	6.3VAC	#185VDC	#190VDC	#0V		
V 18	12AT7	45 VDC	-.2VDC	0V	6.3VAC	6.3VAC	35VDC	-.8VDC	0V	0V
V 19	6SN7GT	-25VDC -30VDC	150VDC	3.3VDC	2.7VDC	35VDC	3.3VDC	6.3VAC	0V	
V 20	6V6GT	0V	6.3VAC	360VDC	360VDC	.2VDC	0V	0V	45VDC 17VDC	
V 21	6C4	1.5VDC	0V	0V	6.3VAC	1.5VDC	-1.4VDC	1.5VDC		
V 22	12BH6	110VDC	-.6VDC	4.2VDC	6.3VAC	6.3VAC	105VDC	-5.8VDC -7VDC	4.2VDC	0V
V 23	6AU5GT	-30VDC	6.3VAC	0V	0V	*	0V	0V	165VDC	
V 24	6W4GT	0V	0V	470VDC	0V	325VDC	0V	6.3VAC	0V	
V 25	1X2A	* DO NOT MEASURE								
V 26	5U4GT	0V	340VDC	115VDC	320VAC	0V	320VAC	0V	340VDC	
V 27	17LP4	6.3VAC	150VDC 33VDC	PIN 10 330VDC	PIN 11 150VDC	PIN 12 0V				

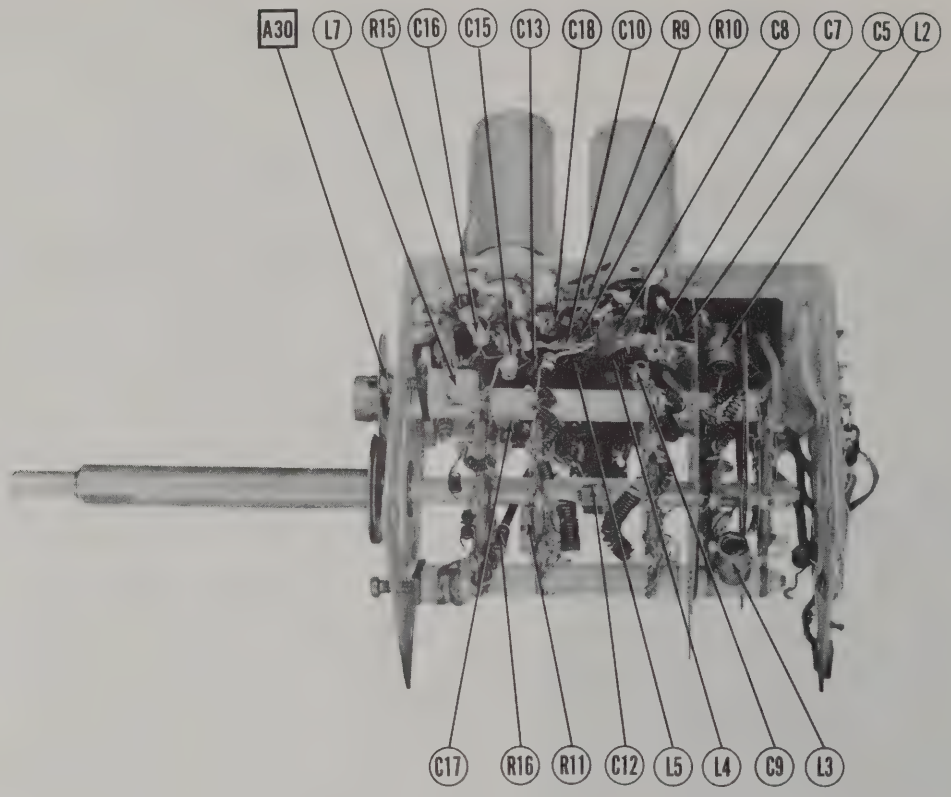
FUNCTION SWITCH IN TV POSITION UNLESS OTHERWISE NOTED
† FUNCTION SWITCH IN FM POSITION
▲ FUNCTION SWITCH IN AM POSITION
MEASURED FROM JUNCTION OF R76, R77, R78, AND C1C.
§ TAKEN WITH VACUMM TUBE VOLTMETER
* DO NOT MEASURE

RESISTANCE READINGS

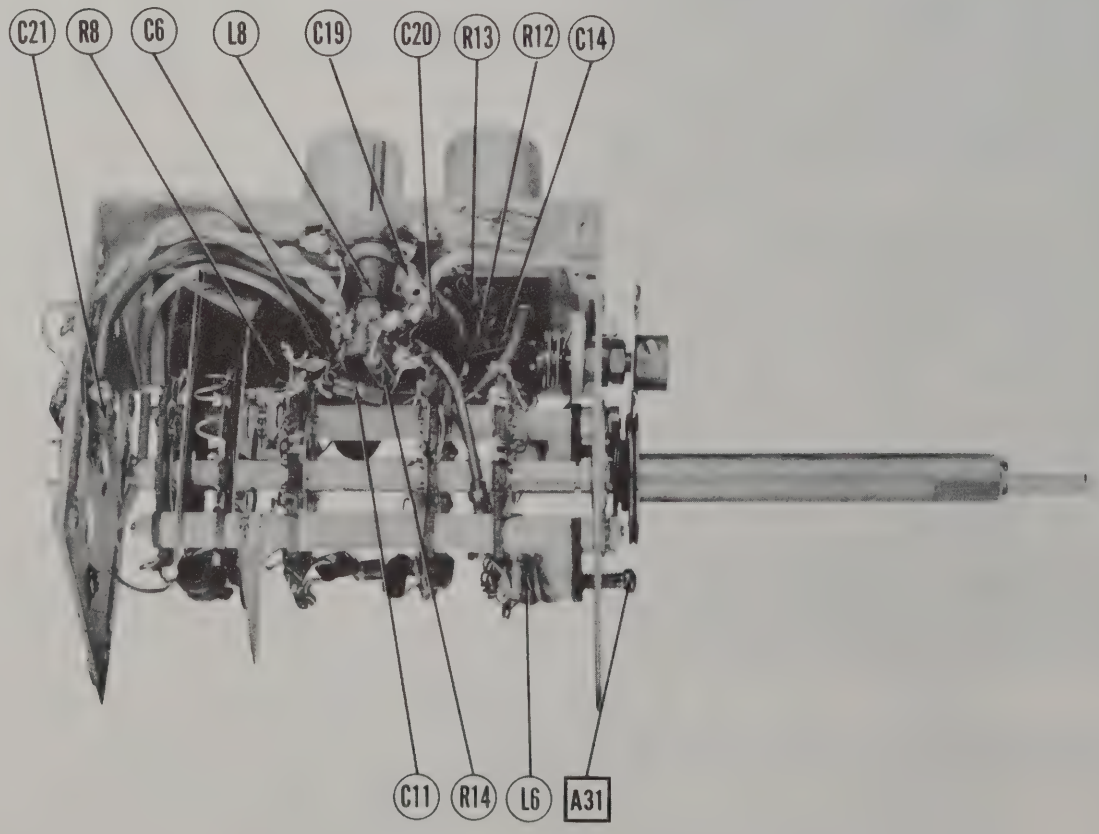
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	105KΩ	100Ω	0Ω	.1Ω	#2.3KΩ	#2.3KΩ	100Ω		
V 2	6J6	#4.8KΩ	#150Ω	0Ω	.1Ω	225KΩ	15KΩ	0Ω		
V 3	6CB6	105KΩ	47Ω	.1Ω	0Ω	#1KΩ	#1KΩ	0Ω		
V 4	6CB6	105KΩ	47Ω	.1Ω	0Ω	#470Ω	#470Ω	0Ω		
V 5	6CB6	.6Ω	150Ω	.1Ω	0Ω	#940Ω	#940Ω	0Ω		
V 6	6AL5	.6Ω	2.2Meg	2Ω	0Ω	0Ω	0Ω	5.6KΩ		
V 7	6AH6	5.6KΩ	0Ω	.1Ω	0Ω	†10KΩ	†68KΩ	1.5KΩ		
V 8	6AU6	#20KΩ	#3KΩ	.1Ω	0Ω	120KΩ	#0Ω	#3KΩ		
V 9	12AT7	† #1KΩ	1Meg	0Ω	0Ω	0Ω	†#1KΩ	10KΩ	0Ω	.8Ω
V 10	6BE6	22KΩ	.9Ω	0Ω	.1Ω	▲#2.2KΩ	▲#2.2KΩ	1.7Meg		
V 11	6BA6	1.7Meg	0Ω	.1Ω	0Ω	†#1KΩ ▲#1KΩ	†#1KΩ ▲#1KΩ	47Ω		
V 12	6AU6	2.6Ω	0Ω	.1Ω	0Ω	#1KΩ	#1KΩ	68Ω		
V 13	6AU6	47KΩ	0Ω	.1Ω	0Ω	#5.6KΩ	#5.6KΩ	0Ω		
V 14	6T8	Inf.	13KΩ	InfΩ	.1Ω	0Ω	▲270KΩ	0Ω	10Meg	#330KΩ
V 15	6C4	#47KΩ	50KΩ	.1Ω	0Ω	#47KΩ	380KΩ	50KΩ		
V 16	6AQ5	#330KΩ	#180Ω	.1Ω	0Ω	†1.3KΩ	†1.1KΩ	#330KΩ		
V 17	6AQ5	#330KΩ	#180Ω	0Ω	.1Ω	†1.3KΩ	†1.1KΩ	#330KΩ		
V 18	12AT7	#15KΩ	15KΩ	0Ω	.1Ω	.1Ω	†25KΩ	1Meg	0Ω	0Ω
V 19	6SN7GT	470KΩ 1 Meg	♦1.2Meg	1.2KΩ	40KΩ	†100KΩ	1.2KΩ	.1Ω	0Ω	
V 20	6V6GT	0Ω	.1Ω	♦5.7KΩ	♦5.7KΩ	2.2Meg	Inf.	0Ω	5.5KΩ 470Ω	
V 21	6C4	†100KΩ	Inf.	0Ω	.1Ω	†100KΩ	200KΩ	100KΩ		
V 22	12BH7	†85KΩ	700KΩ	1.2KΩ	.1Ω	.1Ω	♦300KΩ	150KΩ 400KΩ	1.2KΩ	0Ω
V 23	6AU5GT	470KΩ	.1Ω	0Ω	Inf.	♦90Ω	Inf.	0Ω	†12KΩ	
V 24	6W4GT	Inf.	Inf.	50KΩ	Inf.	†40Ω	Inf.	.1Ω	0Ω	
V 25	1X2A	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	♦415Ω
V 26	5U4G	0Ω	12KΩ	†8KΩ	25Ω	Inf.	25Ω	Inf.	12KΩ	
V 27	17LP4	.1Ω	30KΩ 12KΩ	PIN 10 †36Ω	PIN 11 60KΩ	PIN 12 0Ω				

FUNCTION SWITCH IN TV POSITION UNLESS OTHERWISE NOTED
† FUNCTION SWITCH IN FM POSITION
▲ FUNCTION SWITCH IN AM POSITION
MEASURED FROM JUNCTION OF R76, R77, R78, AND C1C
♦ MEASURED FROM PIN 3 OF V 24
† MEASURED FROM PIN 2 OF V26.

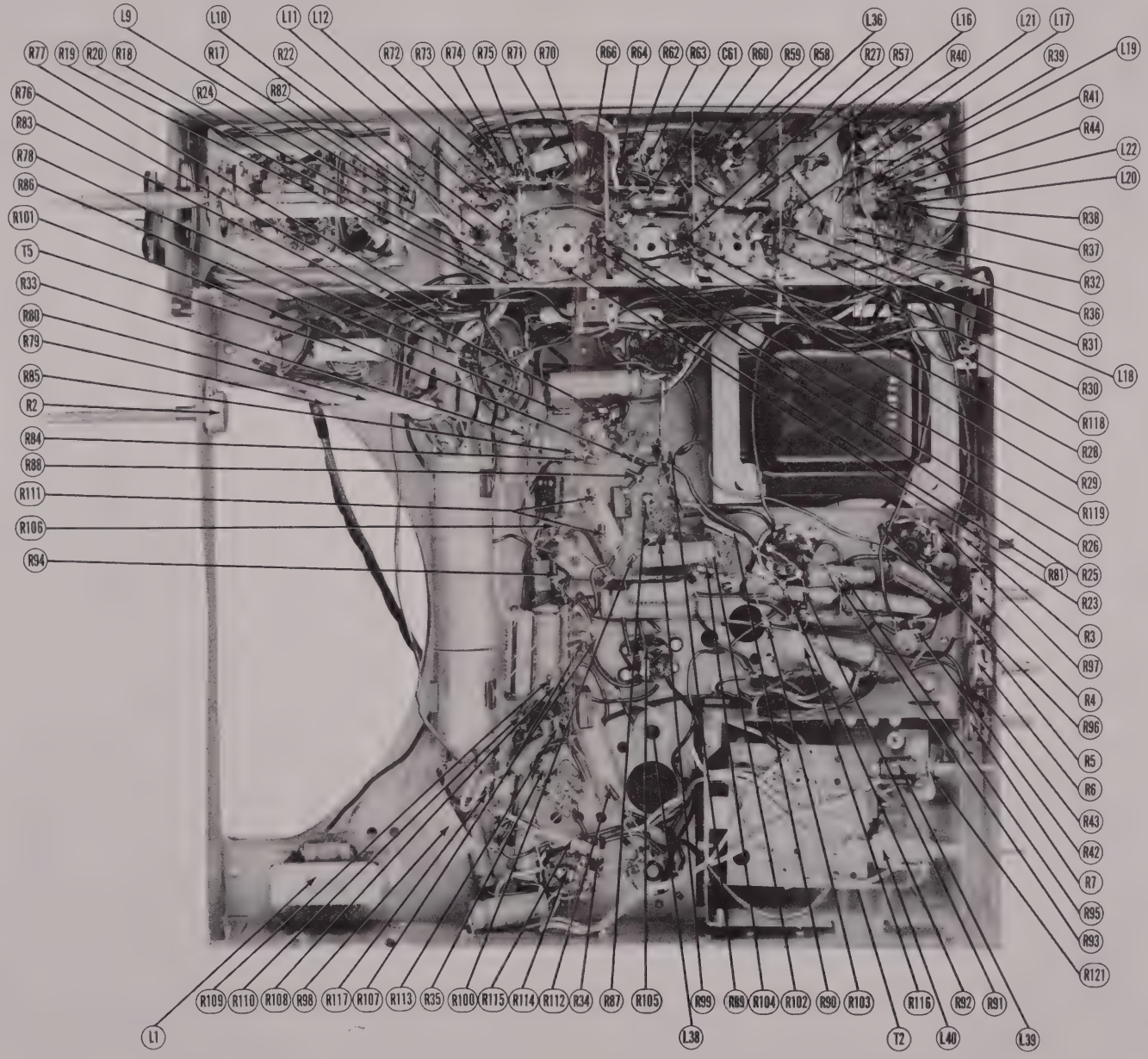
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	WESTINGHOUSE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C51	5.00		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass
C52	27				TCN-27		N750K-27	19C1	Fixed Trimmer
C53	10		RCM20C150K	SI10NPO	TCZ-10	5R5Q1	NPOK-10	19C3	Fixed Trimmer
C54	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	Conv. Decoupling
C55	1	200	RCP10W2104M	P288-1	DF-104	PTE4P1		2TM-P1	AVC Filter
C56	.002	600	RCP10W6202M	P688-002	D6-202	PTE6D2	GP2M-002	6TM-D2	IF Amp. Dec.
C57A	150		‡ V-6232-2	SI150	‡ PC-51	5W5T15	GP2K-150	19C12	Diode RF Filter
B	150			SI150		5W5T15	GP2K-150	19C12	Diode RF Filter
C58	.005	400	RCP10W4502M	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C59	800		V-9863-1	BPD-0008	DD-801	1W5T8	801-001	19C1	AVC Filter
C60	4.7		V-9926-3	SI4.7NPO	TCZ-4.7	5R5V5	NPOK-4.7	MS-55	S. IF Coupling
C61	33		R3CC20SL330K	SI33	D6-330	5W5Q3	GP1K-33	19C24	1st S. IF Grid
C62	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	1st S. IF Dec.
C63	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	1st S. IF Cath.
C64	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass
C65	47	500	RCM20B470K	1468-00005	D6-470	5W5Q5	GP1K-47	1FM-45	S. IF Coupling
C66	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	2nd S. IF Dec.
C67	470		R5CC20ZY471K	SI470	D6-471	5W5T5	GP1K-470	19C15	Diode Load Cap.
C68	.001	200	RCP10W2102M	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	De-emphasis
C69	.006	400	RCP10W4602M	P488-006	D6-562	PTE6D6		6TM-D6	Tone Comp.
C70	.005	400	RCP10W4502M	P488-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C71	150	500	RCM20B151M	1468-00015	D6-151	5W5T15	GP2K-150	1FM-315	AF Amp. Plate
C72	.01	400	RCP10W4103M	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Tone Comp.
C73	.01	400	RCP10W4103M	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Audio Coupling
C74	.05	400	RCP10W4503M	P488-05	DF-503	PTE4S5		4TM-S5	Audio Coupling
C75	.05	400	RCP10W4503M	P488-05	DF-503	PTE4S5		4TM-S5	Audio Coupling
C76	.002	400	RCP10W4202M	P688-002	D6-202	PTE6D2	GP2M-002	6TM-D2	Output Plate Bypass
C77	.25	400	RCP10W4254M	P488-25		GT4P25		4TM-P25	Sync. Coupling
C78	22	500	RCM20B320K	SI22	D6-220	5W5Q2	GP1K-22	19C23	Noise Clipper Plate
C79	270	500	RCM20B271K	1468-00025	D6-271	5W5T25	GP2K-270	1FM-325	Sync. Coupling
C80	.01	400	RCP10W4103M	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Sync. Coupling
C81	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	Sync. Amp.-Sep. Fil. *
C82A	2000		‡ V-9213	P688-002	‡ PC-100	PTE6D2	GP2M-002	6TM-D2	Integrator Net
B	5000			P688-005		PTE6D5	811-005	6TM-D5	Integrator Net
C	5000			P688-005		PTE6D5	811-005	6TM-D5	Integrator Net
C83	.01	400	RCP10W4103K	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Vert. MV Feedback
C84	.05	400	RCP10W4503M	P488-05	DF-503	PTE4S5		4TM-S5	Vert. MV Cathode
C85	.03	400	V-6023-4683K	P688-03		PTE6S3		6TM-S3	Vert. Discharge ♦
C86	.03	400		P688-03		PTE6S3		6TM-S3	Vert. Discharge ♦
C87	.1	400	V-6023-4104M	P488-1	DF-104	PTE4P1		4TM-P1	Vert. Sweep Coupling ♦
C88	.25	400	RCP10W4254M	P488-25		GT4P25		4TMP25	Vert. MV Plate Dec.
C89	100	500	RCM20A101M	1468-0001	D6-101	5W5T1	GP1K-100	1FM-31	Hor. Sync. Coupling
C90	470	500	RCM20B331K	1468-0005	D6-471	5W5T5	GP2K-470	1FM-35	Hor. Phase Det. Plate
C91	330	500	RCM20C331K	1468-00035	D6-331	5R5T3	GP2K-330	MS-33	Hor. Sweep Coupling
C92	.005	400	RCP10W4502M	P688-005	D6-502	PTE6D5	811-005	6TM-D5	AFC Filter
C93	.05	400	RCP10W4503M	P488-05	DF-503	PTE4S5		4TM-S5	AFC Filter
C94	.01	400	RCP10W4103M	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Hor. MV Grid
C95	120		RCM20C121J	SI120	D6-121	5W5T15	GP2K-120	19C29	Hor. MV Feedback
C96	120	500	RCM20C121J	1469-00015	D6-121	5R5T15	GP2K-120	MS-31	Hor. MV Plate
C97	3900	500	RCM30C392K	1464-004		1DR5D4		MS-24	Fixed Trimmer
C98	.1	400	RCP10W4104M	P488-1	DF-104	PTE4P1		4TM-P1	Hor. MV Plate Dec.
C99	.1	600	RCP10W4104M	P688-1	DF-104	PTE6P1		6TM-P1	Hor. MV Plate Dec.
C100	820	500	RCM20C821K			1W5T8		MS-38	Horiz. Discharge
C101	.01	600	RCP10W4103M	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Hor. Sweep Coupling
C102	.1	600	RCP10W4104M	P688-1	DF-104	PTE6P1		6TM-P1	Hor. Output Screen
C103	.03	600	RCP10M6303M	P688-03		PTE6S3		6TM-S3	Damper Filter
C104	.06	600	RCP10W6603M	P688-06		PTE6S6		6TM-S6	Damper Filter
C105	500	20000	V-9901-1	HV20C	TV3-502				H.V. Filter
C106	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	Pic. Tube Fil.
C107	.25	400	RCP10W4254M	P488-25		GT4P25		4TM-P25	Hor. Sweep Coupling
C108	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	RF Bypass *
C109	.01	600	V-5040-15	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Line Filter
C110	.01	600	V-5040-15	P688-01	D6-103	PTE6S1	821-01	6TM-S1	Line Filter
C111	.001	400	RCP10W4102M	P688-001	D6-102	PTE6D1	GP2L-001	6TM-D1	Hor. Phase Det. Cath. †
C112	10		R2CC30CK100D	SI10NPO	TCZ-10	5R5Q1	NPOK-10	19C3	Fixed Trimmer *
C113	10		R2CC30CK100D	SI10NPO	TCZ-10	5R5Q1	NPOK-10	19C3	Fixed Trimmer *
C114	5		R2CC2ICH050D	SI5NPO	TCZ-4.7	5R5V5	NPOK-5	MS-55	Fixed Trimmer *
C115	5000		V-5596	BPD-005	DD-502	1D5D5	811-005	29C1	Ratio Det.-AF Fil. *

* Not Used In All Models.
† Used In Later Production Chassis.
‡ Items C57A, C57B And R67 Are Combined Into One Unit .
‖ Items C82A, C82B, C82C R90A, R90B And R90C Are Combined Into One Unit.
▪ Some Chassis Use .068MFD In Place Of Items C85 And C86. When Deflection Yoke Stamped V-10045-1 Is Used, Items C85 And C86 Are Replaced By .05MFD.
♦ Some Models Use 330MMF In This Application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	INSTALLATION NOTES
R1A	1500Ω	1/2	V-9877			SBBT-565-S	Contrast control - panel
B	500KΩ	1/2					Volume control and SW-tapped ⓐ 50KΩ
R2A	1Meg	1/2	V-10130-1	Q13-137	AG-63-Z	B-70	Tone control
B	Shaft		Not req.	C3 *	FS-5	AK-16 *	Attach to R2A per instructions
R3A	5000Ω	1/2	V-6463	Q11-114	AG-19-S	AN-10	Vert. linearity control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R3A per instructions
R4A	500KΩ	1/2	V-9894-1	Q11-133	AG-58-S	AN-59	Vert. hold control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R4A per instructions
R5A	1Meg	1/2	V-9813-2	Q11-137	AG-61-S	B-69	Height control
B	Shaft		Not req.	Not req.	FKS-1/4	Not req.	Attach to R5A per instructions
R6A	250KΩ	1/2	V-9813-1	Q11-130	AG-55-S	AN-50	Horizontal hold control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R6A per instructions
R7A	50KΩ	1/2	V-9916-1	Q11-123	AG-44-S	AN-31	Brightness control
B	Shaft		Not req.	Not req.	FKS-1/4	AK-1	Attach to R7A per instructions

* Use This Coupler With Original Shaft To Obtain Desired Length.

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ± 10% UNLESS OTHERWISE STATED
R8	32000Ω 20%	‖	RC20AE222M	BTS-2200	RF Amp. Grid
R9	100Ω 20%	‖	RC20AE101M	BTS-100	RF Amp. Cathode
R10	32000Ω 20%	‖	RC20AE222M	BTS-2200	RF Amp. Decoup
R11	4700Ω		RC20AE472K	BTS-4700	RF Coil Shunt
R12	4700Ω		RC20AE472K	BTS-4700	Converter Grid
R13	220KΩ 20%		RC20AE224M		Converter Grid
R14	4700Ω		RC20AE472K	BTS-4700	1stVideo IF Transformer Shunt
R15	15KΩ 20%		RC20AE153M		Osc. Grid
R16	4700Ω		RC20AE472K	BTS-4700	Osc. Plate
R17	10KΩ 20%		RC20AE103M	BTS-10K	AGC Network
R18	10KΩ 20%		RC20AE103M	BTS-10K	AGC Network
R19	47KΩ		RC20AE473M	BTS-47K	AGC Network
R20	47KΩ		RC20AE473M	BTS-47K	AGC Network
R21	2700Ω		RC20AE272K	BTS-2700	1st Video IF Amp. Grid - See Note 1
R22	47Ω		RC20AE470K		1st Video IF Amp. Cathode
R23	1000Ω 20%		RC20AE102M	BTS-1000	1st Video IF Amp. Decoup
R24	10KΩ 20%		RC20AE103M	BTS-10K	AGC Network
R25	4700Ω 5%		V-9927-2	BTS-4700-5%	2nd Video IF Transformer Shunt
R26	470Ω 20%		RC20AE471M	BTS-470	Decoup
R27	3000Ω 5%		V-9927-5		3rd Video IF Transformer Shunt
R28	150Ω		RC20AE151K	BTS-150	3rd Video IF Amp. Cathode
R29	470Ω 20%		RC20AE471M	BTS-470	3rd Video IF Amp. Decoup
R30	82000Ω 5%		V-9927-4		4th Video IF Transformer Shunt
R31	2.2Meg 20%		RC20AE225M	BTS-2.2Meg	Video Det. Diode Load
R32	10KΩ 20%		RC20AE103M	BTS-10K	Isolation
R33	4700Ω		RC20AE472K	BTS-4700	Keyed AGC Grid
R34	10KΩ	2	RC40AE103K	BTB-10K	Keyed AGC Cathode
R35	3300Ω	1	RC30AE332K	BTA-3300	Voltage Divider
R36	56000Ω 5%	1	V-9927-3	BTS-5600-5%	Video Output Grid
R37	68KΩ	1	RC30AE683K	BTA-68K	Video Output Screen
R38	68KΩ	1	RC20AE683K	BTS-68K	Video Peaking Coil Shunt
R39	4700Ω	1	RC30AE472K	BTA-4700	Video Output Plate
R40	4700Ω	1	RC30AE472K	BTA-4700	Video Output Plate
R41	100KΩ		RC20AE104K	BTS-100K	Voltage Divider
R42	62KΩ			BTS-62K	Voltage Divider - See Note 4
R43	12KΩ		RC20AE123K	BTS-12K	Picture Tube Grid
R44	100KΩ		RC20AE104K	BTS-100K	Picture Tube Cathode
R45	470KΩ 20%		RC20AE474M	BTS-470K	Series Phono
R46	1Meg 20%		RC20AE105M		FM Mixer Grid
R47	22Ω				Parasitic Supp. - See Note 1
R48	10000Ω 20%		RC20AE102M	BTS-1000	FM Mixer Plate Decoup
R49	10KΩ 20%		RC20AE103M		FM Osc. Grid
R50	10000Ω 20%		RC20AE102M	BTS-1000	FM Osc. Plate
R51	22KΩ 20%		RC20AE223M		AM Osc. Grid
R52	22000Ω 20%		RC30AE222M	BTS-2200	Decoup
R53	6.8Meg 20%		RC20AE685M	BTS-6.8Meg	AVC Network
R54	47Ω 20%		RC20AE470M		1st Soun IF Amp. Cathode
R55	10000Ω 20%		RC20AE102M	BTS-1000	1st Sound IF Amp. Decoup
R56	15KΩ	2	RC40AE153K	BTB-15K	Voltage Divider - See Note 1
R57	68Ω		RC20AE680K		2nd Sound IF Amp. Cathode
R58	10000Ω 20%		RC20AE102M	BTS-1000	2nd Sound IF Amp. Decoup
R59	47KΩ		RC20AE473K		3rd Sound IF Amp. Grid
R60	56000Ω 20%		RC20AE562M		3rd Sound IF Amp. Decoup
R61	68KΩ		RC20AE683K	BTS-68K	De-emphasis
R62	68000Ω 5%		RC20AE682J	BTS-6800-5%	Ratio Det. Diode Load
R63	68000Ω 5%		RC20AE682J	BTS-6800-5%	Ratio Det. Diode Load
R64	100KΩ		RC20AE104K	BTS-100K	AVC Network
R65	220KΩ 20%		RC20AE224M	BTS-220K	AVC Network
R66	3300Ω		RC20AE332K	BTS-3300	AVC Network
R67	47KΩ		† V-6232-2	BTS-47K	Diode Filter
R68	2.2Meg 20%		RC20AE225M	BTS-2.2Meg	AVC Network
R69	22KΩ 20%		RC20AE223M	BTS-22K	Tone Compensation
R70	10Meg 20%		RC20AE106M	BTS-10Meg	AF Amp. Grid
R71	330KΩ		RC20AE334K	BTS-330K	AF Amp. Plate
R72	330KΩ		RC20AE334K	BTS-330K	Phase Inv. Grid
R73	3300Ω		RC20AE332K	BTS-3300	Phase Inv. Cathode
R74	47KΩ		RC20AE473K	BTS-47K	Phase Inv. Cathode
R75	47KΩ		RC20AE473K	BTS-47K	Phase Inv. Plate
R76	330KΩ		RC20AE334K	BTS-330K	Output Grid
R77	180Ω	1	RC30AE181K	BTA-180	Output Cathode
R78	330KΩ		RC20AE334K	BTS-330K	Output Grid
R79	220Ω	1	RC30AE221K	BTA-220	Output Screen
R80	800Ω	10	V-9600-9	1 3/4A-800	Decoup - Wire Wound
R81	8000Ω	10	V-9600-8	1 3/4A-8000	Decoup - Wire Wound
R82	150Ω		RC20AE151K	BTS-150	Decoup - (Tuner)
R83	1Meg		RC20AE105K	BTS-1Meg	Voltage Divider
R84	1Meg		RC20AE105K	BTS-1Meg	Sync. Sep. Grid
R85	470KΩ		RC20AE474K	BTS-470K	Isolation
R86	15KΩ 20%		RC20AE153M	BTS-15K	Sync. Amp. Plate
R87	70KΩ			BTS-68K	Integrator - See Note 5
R88	22KΩ		RC20AE223K	BTS-22K	Integrator
R89	2200Ω		RC20AE222K	BTS-2200	Voltage Divider
R90A	22KΩ		† V-9213		Integrator.
B	8200Ω				Integrator
C	8200Ω				Integrator
R91	1200Ω		RC20AE122K	BTS-1200	Vert. MV Cathode
R92	100KΩ 20%		RC20AE104M	BTS-100K	Vert. MV Plate
R93	470KΩ		RC20AE474K	BTS-470K	Vert. MV Grid
R94	220KΩ		RC20AE224K	BTS-220K	Vert. MV Plate Decoup
R95	10KΩ		RC20AE103K	BTS-10K	Vert. Peaking
R96	2.2Meg		RC20AE225K	BTS-2.2Meg	Vert. Output Grid
R97	470Ω		RC20AE471K	BTS-470	Vert. Output Cathode
R98	5000Ω	5	V-5925	1 3/4A-5000	Vert. Output Plate Decoup
R99	100KΩ		RC20AE104K	BTS-100K	Horiz. Phase Det. Grid - See Note 4
R100	100KΩ		RC20AE104K	BTS-100K	Horiz. Phase Det. Cathode
R101	100KΩ 20%		RC20AE104M	BTS-100K	Sync. Sep. Plate
R102	470KΩ		RC20AE474K	BTS-470K	Isolation
R103	100KΩ		RC20AE104K	BTS-100K	Isolation
R104	47KΩ		RC20AE473K	BTS-47K	Horiz. MV Grid - See Note 1
R105	1200Ω		RC20AE122K	BTS-1200	Horiz. MV Cathode
R106	27KΩ		RC20AE273K	BTS-27K	Horiz. MV Plate - See Note 6
R107	150KΩ		RC20AE154K	BTS-150K	Horiz. MV Grid - See Note 2
R108	270KΩ		RC20AE274K	BTS-270K	Horiz. MV Plate
R109	33KΩ		RC20AE333K	BTS-33K	Voltage Divider
R110	12KΩ		RC20AE123K	BTS-12K	Horiz. Peaking

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
R111	56KΩ	1/2	RC20AE563K	BTS-56K	Horiz. MV Plate Decoup - See Note 3
R112	120Ω 20%	1/2	RC20AE121M		Parasitic Supp
R113	470KΩ	1/2	RC20AE474K	BTS-470K	Horiz. Output Grid
R114	39KΩ	1	RC30AE393K	BTA-39K	Horiz. Output Screen
R115	18KΩ	2	RC40AE183K	BTB-18K	Horiz. Output Screen
R116	110Ω	5	V-6984-7		Width Coil Shunt - Wire Wound
R117	22KΩ	1/2	RC20AE223K	BTS-22K	AGC Network
R118	220KΩ 20%	1	RC30AE224M	BTA-220K	Isolation
R119	47Ω	1/2	RC20AE470K		2nd Video IF Amp. Cathode
R120	470KΩ 20%	1	RC30AE474M		HV Filter
R121	5600Ω	1/2	RC20AE562K	BTS-5600	Horiz. Linearity Coil Shunt - See Note 1

Note 1. Not used in all models.
Note 2. Some models use parallel resistors to obtain desired resistance in this application.
Note 3. Some models use series resistors to obtain desired resistance in this application.
Note 4. Some models use 68KΩ resistor in this application.
Note 5. Some models use 1Meg resistor in this application.
Note 6. Some models use 18KΩ resistor in this application.
‡ Items R67, C57A and C57B are combined into one unit.
† Items R90A, R90B, R90C, C82A, C82B and C82C are combined into one unit.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.
T1	117VAC	690VCT	5V	12.6V	V-9958	P-8156 ① ②	P-3066 ①	TP-365 ①
	ⓐ 1.8A	.225ADC	ⓐ 5A	ⓐ 5.6A				

① Add series resistor to reduce high voltage.
② Drill new mtg. holes.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	NOTES
T2	395Ω	.10Ω	V9904-1				Horiz. Output Trans.
	tapped ⓐ	tapped ⓐ					
	68Ω	6Ω, 8.6Ω					
		SEC. 2					
		0Ω					
T3	650Ω	7.8Ω	V-6981-3	A-8112 ①	A-3038	TSO-5	Vert. Output Trans.
T4	34Ω		V-10049-3				Horiz. Deflection Coil
	35Ω						Vert. Deflection Coil

① Drill on new mtg hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA Westinghouse PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	INSTALLATION NOTES
T5	7.4KΩ CT	3.2Ω	440Ω CT	.9Ω	V-9983		A-2938 ②	RO-304 ②	② Drill one new mtg hole.

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	PM	3.2	V-9431-2	ST-101 Mod. P12-T	12A31	
	CONE DIA.	V. C. DIA.				
SP2	11 1/2"	1"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA Westinghouse PART No.	REPLACEMENT DATA STANCOR PART No.	REPLACEMENT DATA MERIT PART No.	REPLACEMENT DATA CHICAGO PART No.	INSTALLATION NOTES
L1	.225ADC	36Ω	1.2 Henries	V6471-2	C-2325 ①	C-2974	TR-3300①	① Drill one new mtg. hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA WESTINGHOUSE PART No.	REPLACEMENT DATA MEISSNER PART No.	REPLACEMENT DATA IRC PART No.	NOTES
L2	Antenna Coil	0Ω	0Ω				
L3	Antenna Coil	0Ω	0Ω				
L4	RF Coil	0Ω					
L5	Mixer Grid Coil	0Ω					
L6	Osc. Coil	0Ω					
L7	Osc. Coil	0Ω					
L8	1st Video IF	.1Ω	.1Ω				
L9	Fil. Choke	.1Ω *		V-4886-2			1.1 Microhenries
L10	1st Video IF Coupling	.1Ω	.1Ω	V-9881-2			

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

ITEM No.	USE	DC RES.		REPLACEMENT DATA			NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	IRC PART No.	
L11	Sound Trap	.1Ω		V-9501-1			1.1 Microhenries Black Dot
L12	Fil. Choke	.1Ω		V-4886-2			
L13	2nd Video IF	.6Ω	.6Ω	V-9879			
L14	3rd Video IF	.6Ω	.6Ω	V-9879			
L15	4th Video IF	.6Ω	.6Ω	V-9880			
L16	Fil. Choke	2.6Ω		V-9099-4		CL-1	3.9 Microhenries
L17	Noise Clipper Decoupling	1.4Ω		V-4886-1			14 Microhenries
L18	Peaking	8Ω		V-9915-1	19-1920		100 Microhenries
L19	Sync. Decoupling	1.4Ω		V-4886-1			14 Microhenries
L20	Peaking	9Ω		V-9915-2	19-1923		350 Microhenries
L21	Peaking	18Ω		V-9915-3	19-1923		500 Microhenries
L22	Video Decoupling	1.4Ω		V-4886-1			14 Microhenries
L23	FM Ant. Coil	0Ω		V-10097-1			
L24	FM RF Coil	0Ω		V-10091-1			
L25	FM RF Coil	0Ω		V-10091-1			
L26	FM RF Coil	0Ω		V-10091-1			
L27	FM osc. Coil	0Ω		V-10090-1			
L28	Loop Antenna	2Ω					Around Cabinet
L29	Loop Antenna Loading Coil	1.8Ω		V-6157-1			
L30	AM Osc. Coil	9Ω		V-10089	14-1073		Tap at .9Ω
L31	Fil. Choke	1.2Ω		V-9099-1		CLA	1.5 Microhenries
L32	1st AM IF	16Ω	16Ω	V-6130-1	16-6758		
L33	1st FM IF	2.7Ω	2.7Ω	V-10077-1			
L34	2nd AM IF	16Ω	16Ω	V-6130-1	16-6758		
L35	2nd FM IF	5Ω	2.6Ω	V-10078-1			
L36	Sound IF	2.6Ω					
L37	Ratio Det. Trans.	4.6Ω	1.8Ω	V-9885			
L38	Ringing Coil	105Ω		V-6764			
L39	Horiz. Lin.	19Ω		V-9960			
L40	Width Coil	95Ω	1.1Ω	V-9902			

PHONO CARTRIDGE and NEEDLE

ITEM No.	REPLACEMENT DATA					REMARKS
	WESTINGHOUSE PART No.	ASTATIC PART No.		SHURE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	V-8350	AC-AG-J	A-AG	W26B	A66U	

ASTATIC AND SHURE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED.

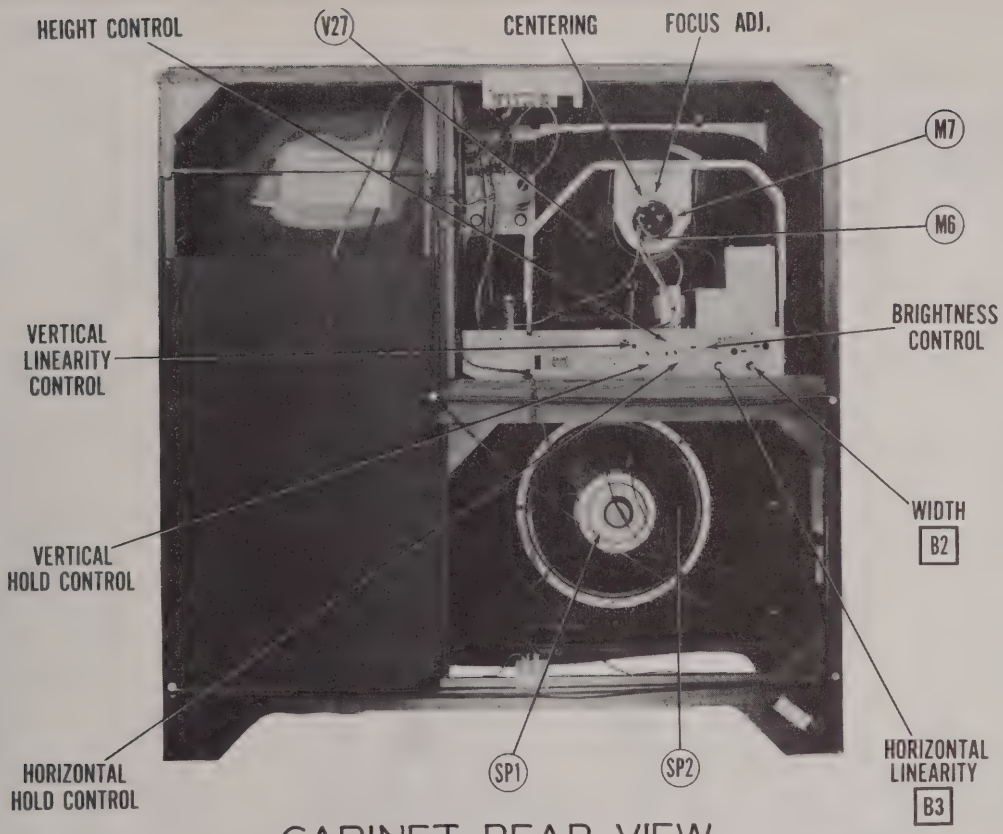
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					WESTINGHOUSE PART No.		
M2	Bayonet	6-8	.25	Blue			Type #44
M3	Bayonet	6-8	.25	Blue			Type #44

MISCELLANEOUS

ITEM No.	PART NAME	WESTINGHOUSE PART No.	NOTES
M4	RF Tuner	V-9886	
M5	Switch	V-10095-1	Function, Phono-AM-FM-TV
M6	Ion Trap	V-9784-2	
M7	Focus Magnet	V-10206-2	
M8	Tuning Capacitor	V-9671-2	AM Tuning (44-524MMF, 40-216MMF)
A29	Trimmer	V-9876	1.6-18MMF Sound Trap
	Safety Glass	V-10043-2	
	Escutcheon	V-9953-4	Channel Selector
	Knob	V-9941-1	Channel Selector
	Knob	V-9940-1	Fine Tuning
	Knob	V-9939-1	Contrast
	Knob	V-9938-1	Volume
	Knob	V-9939-3	Tone Rear
	Knob	V-9938-2	Tone Front

RADIO CHASSIS-BOTTOM VIEW



CABINET–REAR VIEW

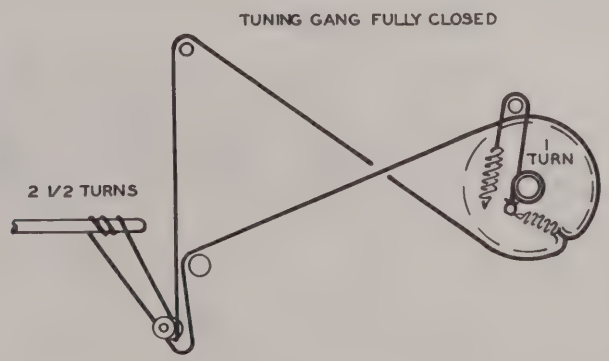
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.
Turn the horizontal hold control to the mid-position of its range.
Adjust the "ringing coil" core (B1) until the picture synchronizes horizontally.
Adjust the width slug (B2) until the picture fills the mask horizontally.
Adjust the horizontal linearity slug (B3) until the picture is symmetrical from left to right.

DISASSEMBLY INSTRUCTIONS

1. Remove nine push-on type control knobs.
2. Remove seven 1/4" hex head screws holding rear cover in place. Remove rear cover.
3. Disconnect built-in antenna.
4. Disconnect phono leads at jack.
5. Remove antenna terminal strip.
6. Disconnect power plug.
7. Disconnect external ground from TV chassis.
8. Disconnect TV speaker leads.
9. Remove six 11/32" hex head screws holding chassis in cabinet. Remove chassis.
10. Remove four 5/16" hex nuts holding speaker in cabinet. Remove speaker.

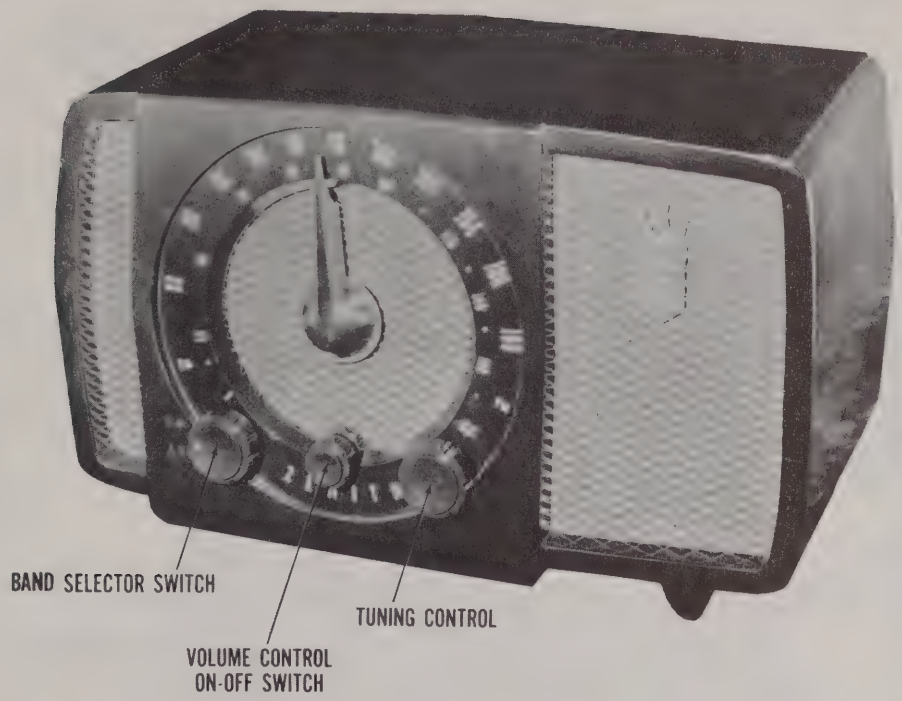
NOTE: TUBE REMOVAL, IT IS NECESSARY TO REMOVE CHASSIS AS OUTLINED ABOVE.



DIAL CORD STRINGING

ZENITH
MODEL H723 (Ch. 7H04)

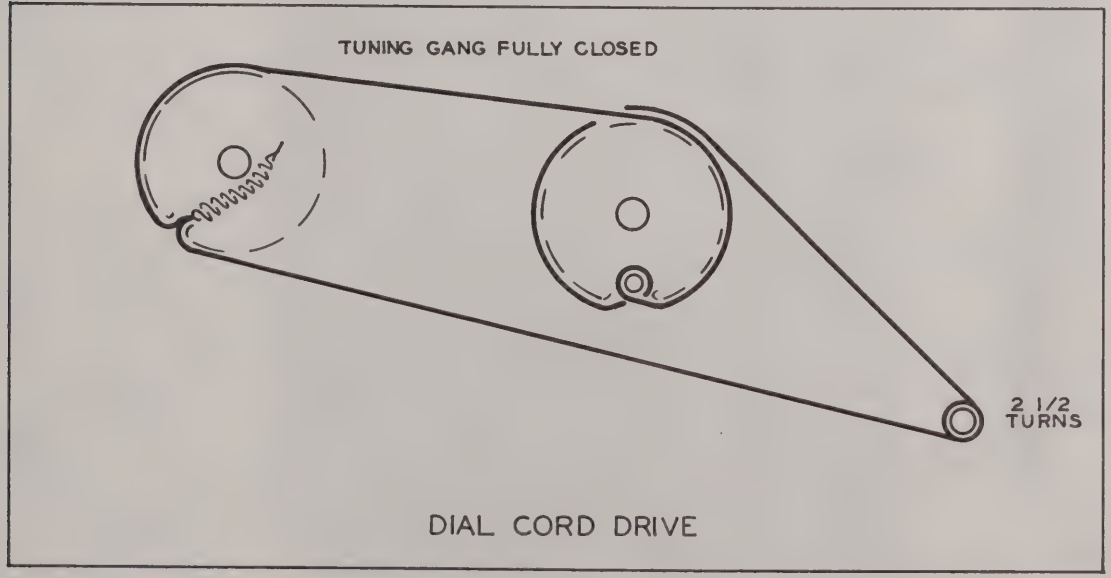
ZENITH
MODEL H723 (Ch. 7H04)



ZENITH
MODEL H723 (Ch. 7H04)

ZENITH MODEL H723

TRADE NAME	Zenith, Model H723 (Ch. 7H04)	
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Illinois	
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver With Loop Antenna	
TUBES (SEVEN)	Types 12BA6 FM RF Amp., 12AT7 Converter, 12BA6 1st IF Amp., 12BA6 FM 2nd IF Amp., 12AU6 Limiter, 19T8 Det.-AVC-AF, 35C5 Power Output.	
POWER SUPPLY	110-120 Volts AC-DC	RATING .31 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1620KC	FREQ. MOD. 88-108MC



DIAL CORD DRIVE

HOWARD W. SAMS & CO., INC. • Indianapolis 1, Indiana

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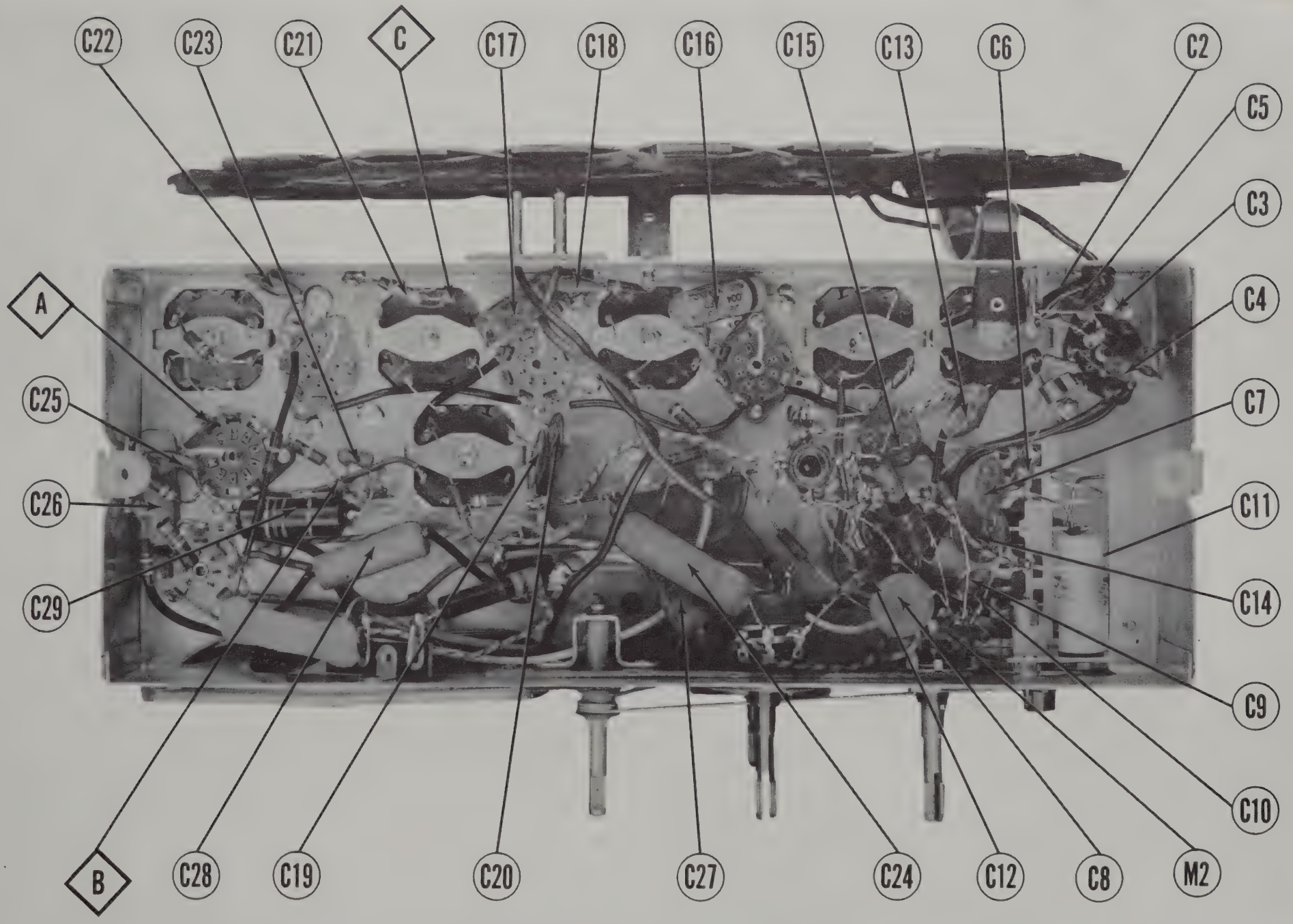
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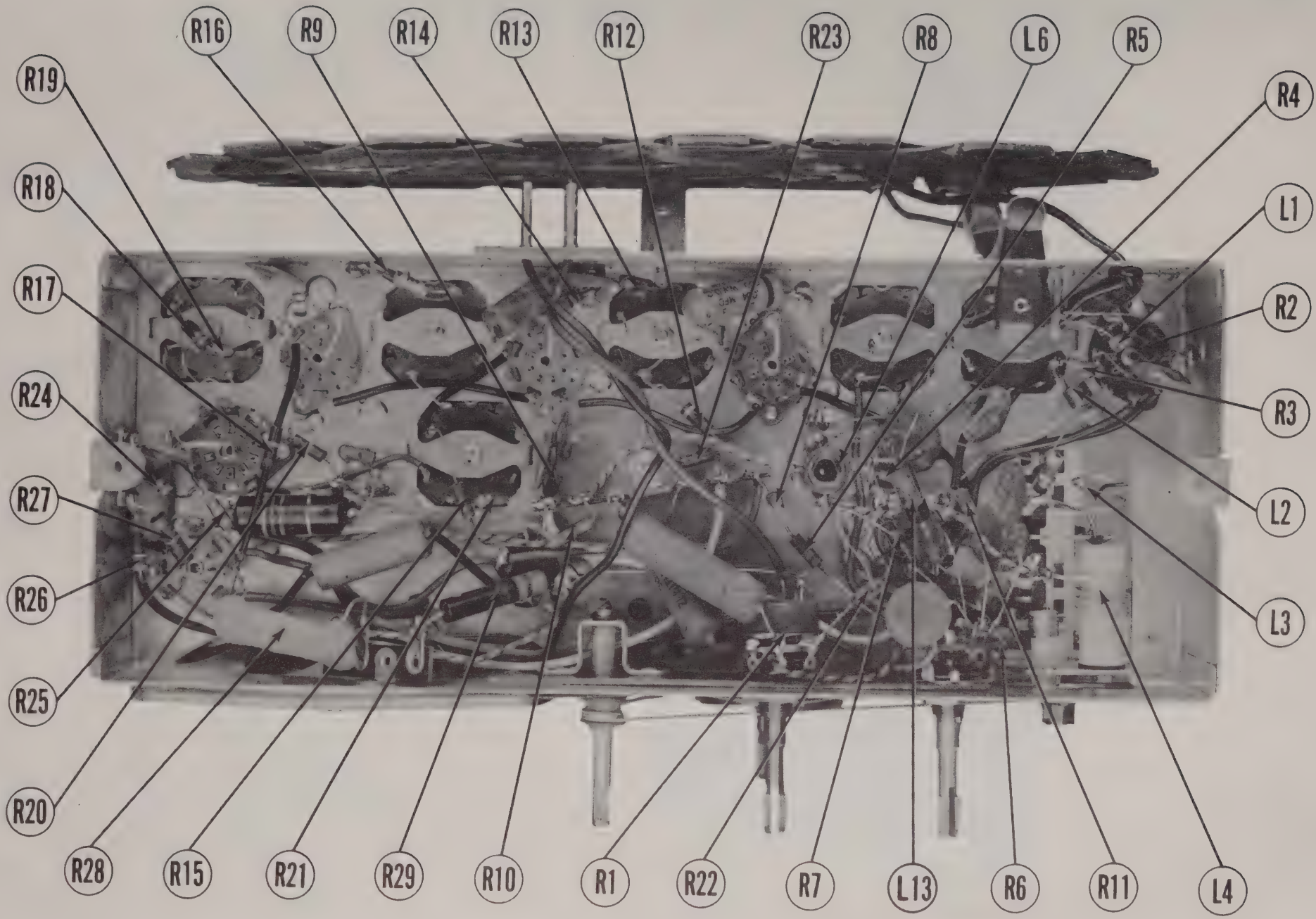
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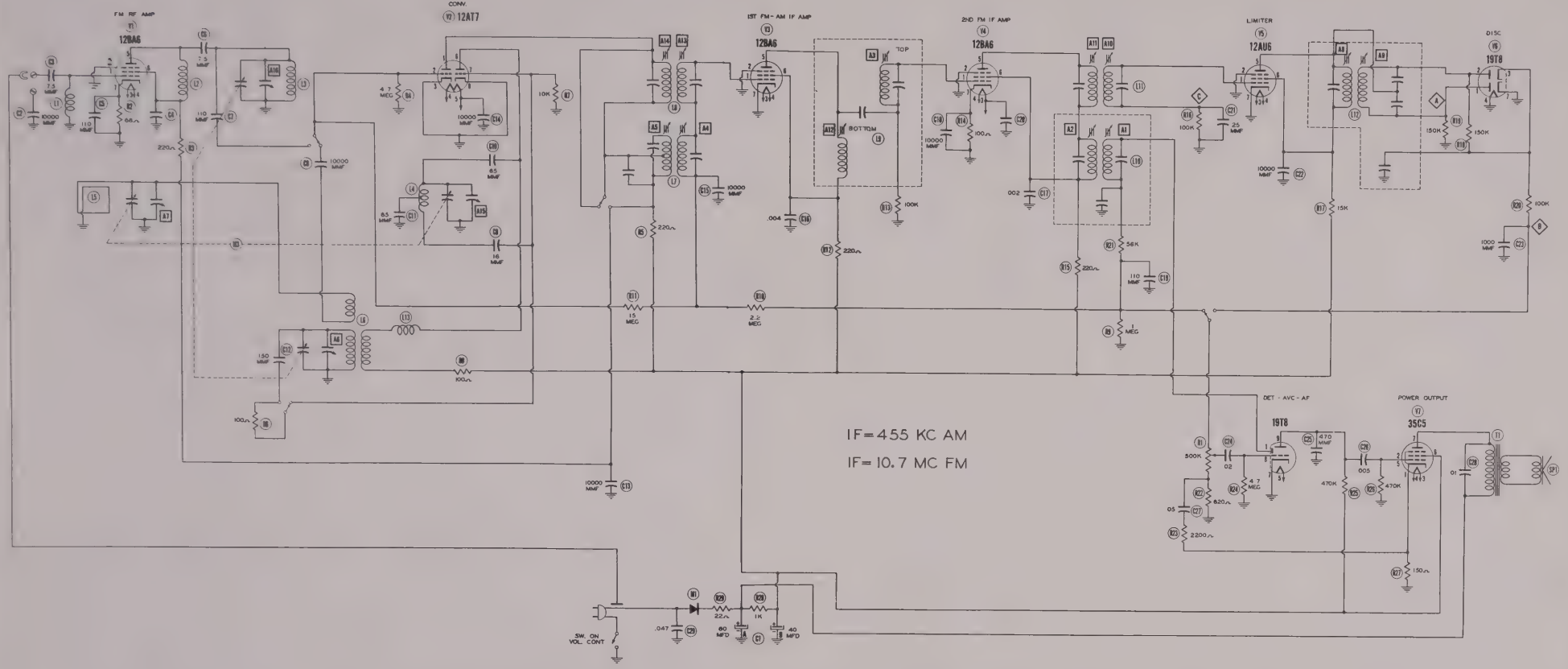

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12BA6	0V	0V	80VAC	67VAC	80VDC	80VDC	6VDC		
V 2	12AT7	80VDC	†. 7VDC ‡-2.5VDC	0V	55VAC	67VAC	80VDC	†1.7.5VDC ‡4-4.5VDC	0V	80VAC
V 3	12BA6	-.6VDC	0V	55VAC	42VAC	80VDC	80VDC	0V		
V 4	12BA6	0V	0V	42VAC	30VAC	80VDC	80VDC	1.3VDC		
V 5	12AU6	-.4VDC	0V	30VAC	18VAC	† 80VDC ‡ 45VDC	45VDC	0V		
V 6	19T8	†-1.3VDC ‡-.5VDC	†-1.3VDC ‡-.6VDC	0V	0V	18VAC	-.7VDC	0V	-.6VDC	7VDC
V 7	35C5	4.8VDC	0V	80VAC	117VAC	0V	80VDC	120VDC		

§ TAKEN WITH VACUUM TUBE VOLTMETER

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12BA6	0Ω	0Ω	70Ω	60Ω	†1.5KΩ	†1.5KΩ	58Ω		
V 2	12AT7	†1.2KΩ ‡3.5Meg	†4.5Meg ‡3.5Meg	0Ω	58Ω	60Ω	†1.1KΩ ‡1.2KΩ	10KΩ	0Ω	55Ω
V 3	12BA6	∞3.5Meg	0Ω	50Ω	40Ω	†1.2KΩ	†1.2KΩ	0Ω		
V 4	12BA6	100KΩ	0Ω	40Ω	30Ω	†1.2KΩ	†1.2KΩ	100Ω		
V 5	12AU6	100KΩ	0Ω	30Ω	18Ω	†18KΩ	†18KΩ	0Ω		
V 6	19T8	†150KΩ ‡180KΩ	†150KΩ ‡180KΩ	†250KΩ ‡300KΩ	0Ω	18Ω	†1Meg ‡.500KΩ	0Ω	4.7Meg	†470KΩ
V 7	35C5	150Ω	470KΩ	70Ω	110Ω	470KΩ	11KΩ	1260Ω		

† MEASURED FROM OUTPUT OF M1

† TAKEN IN FM POSITION
‡ TAKEN IN AM POSITION

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning gang fully closed and set pointer at the dot near the low frequency end of the dial scale. Use an isolation transformer to protect the test equipment.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	465KC (400 ∿ Mod.)	AM (Counter-clockwise)	Tuning gang fully open	Across voice coil.	A1, A2, A3, A4, A5	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1620KC	"	"	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for max. output.
3.		Loop	1400KC	"	Tune for max. output.	"	A7	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (Unmod.)	FM (Clock-wise)	Tuning gang fully open.	DC probe thru 2 megs to point (A). Common to chassis.	A8 (bottom)	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A9 (top)	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	High side to pin 1 (grid) at 12BA6 (V4). Low side to chassis.	"	"	"	DC probe thru 2 megs to point (C). Common to chassis.	A10, A11	Adjust for maximum deflection.
7.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	"	A12	"
8.	"	High side to pin 2. (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A13, A14	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60 ∿ modulation and 450KC sweep. Use 120 ∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (450KC SWP)	FM (Clock-wise)	Point of non-interference	Vert. Amp. to point (B). Low side to chassis.	A8, A9	Adjust A9 so 10.7MC occurs at center of crossover lines as per figure 1. Adjust A8 for max. amplitude and straightness of crossover lines.
5.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	Vert. amp. to point (C). Low side to chassis.	A10, A11	Adjust for maximum amplitude and symmetry as per figure 2.
6.	"	High side to pin 1 (grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A12	"
7.	"	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A13, A14	" Continue with step 9.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	108.5MC (Unmod.)	FM	Tuning gang fully open	DC probe thru 2 megs to point (C). Common to chassis.	A15,	Adjust for maximum output.
10.	"	"	98MC	FM	Tune for max. deflection	"	A16	"

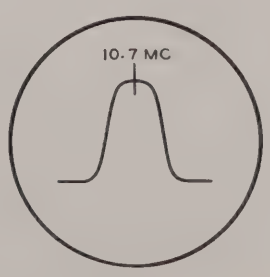


FIG. 1

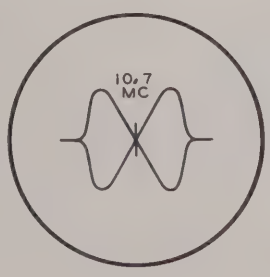


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	FM RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12AT7	12AT7	9A	
V3	1st FM AM IF Amp.	12BA6	12BA6	7BK	
V4	2nd FM IF Amp.	12BA6	12BA6	7BK	
V5	Limiter	12AU6	12AU6	7BK	
V6	Discr.-Det.-AVC-AF Amp.	19T8	19T8	9E	
V7	Power Output	35C5	35C5	7CV	

CAPACITORS

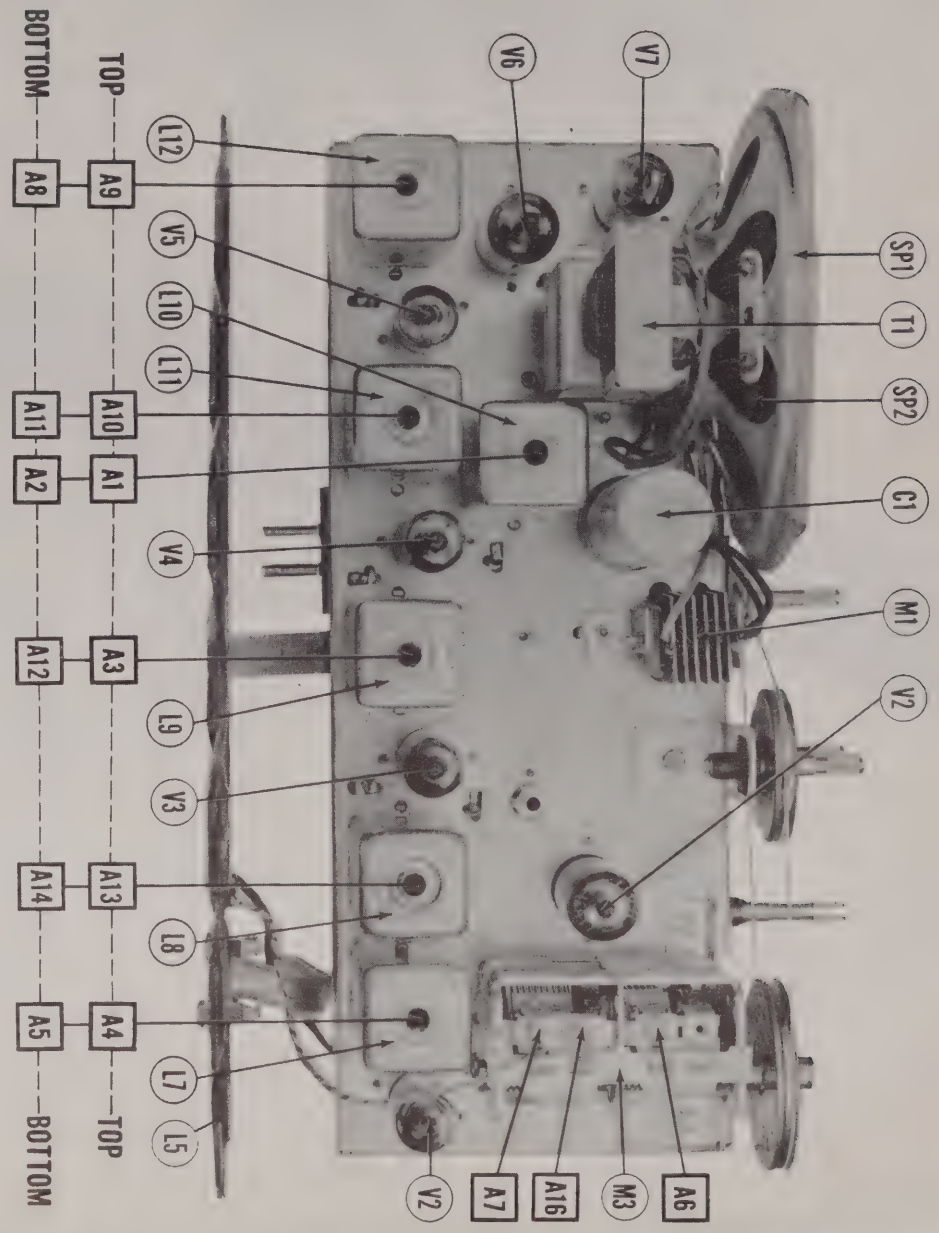
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	80	150	22-1757	AF888D		UPE8415		TVL-2442	■ Filter
B	40	150							▲ Filter
C2	10000		22-2	BPD-01	DD-103	PTE4S1	821-01	36C1	Ant. Isolation
C3	7.5		22-1852	SI8.2NPO	TCZ-6.8		NPOK-8.2		RF Coupling
C4	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	RM RF Dec.
C5	110		22-5	SI120	D6-121	5W5T15	GP2K-120	19C29	FM RF Cathode
C6	7.5		22-1852	SI8.2NPO	TCZ-6.8		NPOK-8.2		RF Coupling
C7	110		22-5	SI120	D6-121	5W5T1	GP2K-120	19C29	RF Coupling
C8	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	RF Coupling
C9	16		22-2257		TCN-15		N750K-16	19C6	Osc. Grid Cap
C10	65		22-2256		TCN-68		N750L-65	29C15	Osc. Feedback
C11	85		22-2258				NPOM-85		Fixed Trimmer
C12	150		22-1675	SI150	D6-151	5W5T15	GP2K-150	19C12	Osc. Grid Cap.
C13	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	Decoupling
C14	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	Conv. Fil. Bypass
C15	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	AVC Filter
C16	.004	600	22-448	P688-004	D6-402	PTE6D4	GP2M-004	6TM-D4	1st IF Dec.
C17	.002	600	22-1220	P688-002	D6-202	PTE6D2	GP2M-002	6TM-D2	2nd IF Dec.
C18	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	2nd IF Cathode
C19	110		22-5	SI120	D6-121	5W5T15	GP2K-120	19C29	Diode RF Filter
C20	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	2nd IF Fil.
C21	25		22-1507	SI25	D6-250	5W5Q25	GP1K-25	19C27	Limiter Grid Filter
C22	10000		22-3	BPD-01	DD-103	PTE4S1	821-01	36C1	Limiter Dec.
C23	1000		22-1676	SI1000	D6-102	1W5D1	GP2L-001	19C1	De-emphasis
C24	.02	600	22-830	P688-02	DF-203	PTE6S2		6TM-S2	Audio Coupling
C25	470		22-6	SI470	D6-471	5W5T5	GP2K-470	19C15	AF Amp. Plate
C26	.005	600	22-229	P688-005	D6-502	PTE6D5	811-005	6TM-D5	Audio Coupling
C27	.05	200	22-1158	P288-05	DF-503	PTE4S5		2TM-S5	Tone Comp.
C28	.01	400	22-1126	P488-01	D6-103	PTE4S1	821-01	4TM-S1	Output Plate Bypass
C29	.047	400	22-1775	P488-047	DF-503	PTE4S5		4TM-S47	Line Filter

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	
R1A	500KΩ	½	63-2143	Q13-133	AG-60-Z	BSK-60-S	Volume control
B	Shaft		Not req.	Not req.	KSS-3	Not req.	Attach to R1A per instructions
C	Switch		Not req.	Not req.	SWB	Not req.	Attach to R1A per instructions

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	
R2	68Ω	½	63-1737		FM RF Amp. Cathode
R3	220Ω	½	63-1758	BTS-220	FM RF Amp. Decoup
R4	4.7Meg	½	63-1940		Converter Grid
R5	220Ω	½	63-1758	BTS-220	Converter Decoup
R6	100Ω	½	63-1744		Parasitic Supp
R7	10KΩ	½	63-1828		Osc. Grid
R8	100Ω	½	63-1744	BTS-100	Osc. Plate
R9	1Meg	½	63-1912	BTS-1Meg	AVC Network
R10	2.2Meg	½	63-1926	BTS-2.2Meg	AVC Network
R11	15Meg	½	63-1961	BTS-15Meg	AVC Network
R12	220Ω	½	63-1940	BTS-220	IF Amp. Decoup
R13	100KΩ	½	63-1870		FM AF Amp. Grid
R14	100Ω	½	63-1744	BTS-100	FM IF Amp. Cathode
R15	220Ω	½	63-1758	BTS-220	FM IF Amp. Decoup
R16	100KΩ	½	63-1870	BTS-100K	Limiter Grid
R17	15KΩ	½	63-1835	BTS-15K	Limiter Decoup
R18	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R19	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R20	100KΩ	½	63-1870	BTS-100K	De-emphasis
R21	56KΩ	½		BTS-56K	Diode Filter - See Note
R22	820Ω	½	63-1782	BTS-820	Tone Compensation
R23	2200Ω	½	63-1800	BTS-2200	Tone Compensation
R24	4.7Meg	½	63-1940	BTS-4.7Meg	AF Amp. Grid
R25	470KΩ	½	63-1898	BTS-470K	AF Amp. Plate
R26	470KΩ	½	63-1898	BTS-470K	Output Grid
R27	150Ω	½	63-686	BW-½-150	Output Cathode - Wire Wound
R28	1000Ω	3	63-1527		Filter - Wire Wound
R29	22Ω	1	63-1450		Surge Limiter - Wire Wound

Note: Some models use 47KΩ resistor in this application.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ZENITH PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	3.3KΩ	3.9Ω	260Ω	.6Ω	49-689	A-3876 ①	A-2928 ①	RO-2 ①	① Bend mounting tabs down, file out slots and mount on original bracket.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.				
SP1	PM	3.9Ω	49-689	525J4	52A1	
	CONE DIA.	V. C. DIA.				
SP2	5 1/8"	9/16"	ZC5091			

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA			NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	IRC PART No.	
L1	FM Any. Coil	0Ω		20-329			
L2	RF Choke	0Ω		20-330			
L3	FM RF Coil	0Ω		20-331			

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES	
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.		
L4	FM Osc. Coil	0Ω					
L5	Loop Antenna	1.4Ω		S-17364			
L6	AM Osc. Coil	3.6Ω	8Ω	S-17340			
L7	1st AM IF	16Ω	5Ω	95-1250			
L8	1st FM IF	.4Ω	.4Ω	95-1150			
L9A	2nd AM IF	25Ω		95-1251			
B	2nd FM IF	1.8Ω					
L10	3rd AM IF	20Ω	20Ω	95-1102			
L11	3rd FM IF	.4Ω	.4Ω	95-1150			
L12	Disc. Trans.	.3Ω	.3Ω	95-1153			
L13	RF Choke	8Ω		20-333		CL-1	10 Microhenries

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	ZENITH PART No.	SYLVANIA PART No.	SELETRON PART No.	
M1	.078A	212-7	NC-5	6M1	

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M2	Switch	85-493	AM-FM
M3	2 Gang Var. Cap.	22-2255	(17-477MMF, 12-202MMF)
A15	Trimmer	22-2253	FM Osc. Adj.
	Cabinet	14-1272	
	Dial Pointer	59-251	
	Knob	46-859	Band
	Knob	46-860	Tuning
	Knob	46-900	Volume

REELEST
MODEL C1A

Figure 1

Figure 2

REELEST
MODEL C1A

GENERAL INFORMATION

The UNIVERSAL REELEST TAPE RECORDER is designed to magnetically RECORD-REPRODUCE two parallel tracks in opposite direction on 1/4" wide magnetic recording tape. The tape operates at a constant speed of 7 1/2" per second and is automatically reversed by means of a contact sticker which must be applied to the tape. The machine features manual and automatic reverse and fast winding in either direction by operating two control levers. Provision is made for 7" diameter reels which records or reproduces without rethreading. The unit operates only on 115 V, 60 Cycles A. C.

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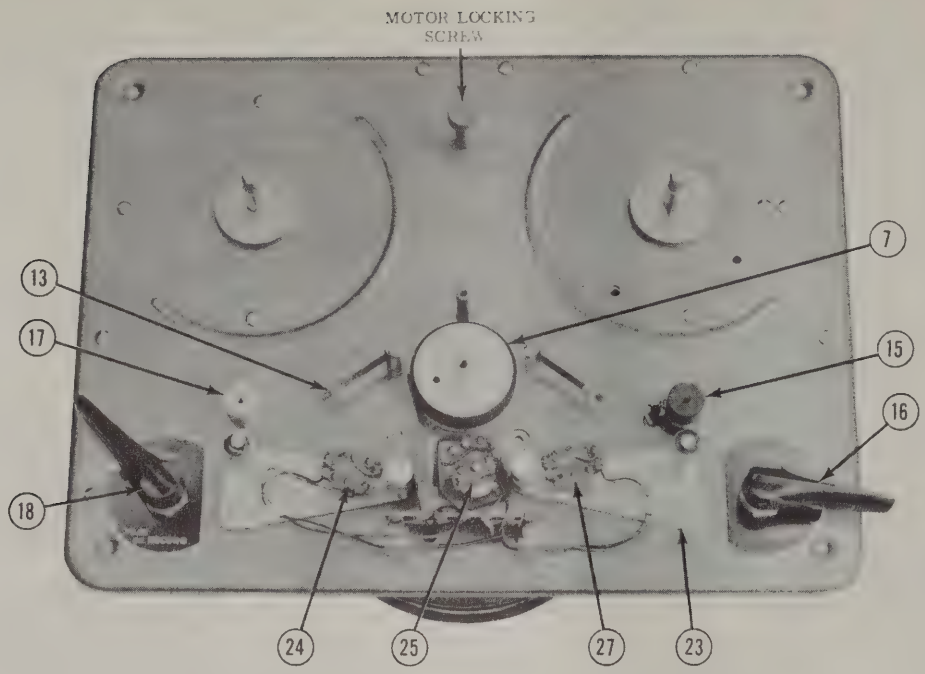


Figure 3

OPERATING INSTRUCTIONS

Before the unit can be placed into operation, the red motor locking screw must be removed. This post anchors the motor and separates precision ground driving surfaces when machine is idle or being carried. Replace this screw when recorder is not in use and do not operate right-hand lever (16) to forward position with screw in place.

Record-Play Head:

The "Record-Play" head (25) is mounted in such a manner as to allow it to move up when tape is traveling in the "Forward" direction, (from right to left) and down when in "Reverse," resulting in two tracks of recording - one in each direction, one above the other. This head (25) either plays or records, depending on amplifier setting, or retracts for loading or high speed rewind depending upon the position of play-record control (18).

Erase Heads:

The two outer heads (24) are arranged in such a manner that the right head erases the "upper, forward track" and the left head erases the "lower, reverse track". The motor control lever (16) automatically selects the correct head to accomplish any desired erasure. The erase heads are normally energized only when the amplifier is in the "Record" position.

Threading of Tape:

1. Turn the control knob (18) to the "Tape Out" or "Load or Rewind" position. This operation pivots the right and left-hand erase heads (24) and the recording head (25) away from their play position. This provides clearance for threading the tape.

2. Place a full reel of tape on the platform (5A) in a position so that the tape will unwind in a clockwise direction. The coated side of the tape should face outward on the reel. The coated side of the tape is the dull side of Plastic tape.

3. Pull the tape through the slot between the rear bezel (3) and the front bezel (10).

4. Place an empty reel on the takeup reel platform (5) and feed the end of the tape up through one of the slots in the reel. Hold the end of the tape and rotate the reel, in a clockwise direction, four or five revolutions. Make sure the coated side of the tape is always facing outward and untwisted.

Recording:

1. To make a recording, turn the control knob (18) to "Tape In" or "Play or Record" position. This pivots the erase heads (24) and recording head (25) into their normal playing position. Do not force this knob for it is spring loaded to assume the proper position as the motor is started.

2. Turn the control knob (16) to "Forward" position. This starts the unit and also moves the recording head (25) to the upper half of the recording tape.

(a) The tape moves at a fixed rate of speed (7.5" per second) past the recording head (25) due to the position of the erase heads; i.e., when the control knob (18) is set up for "Tape In" or "Play or Record". The erase heads, in this position, hold the tape in contact with capstan surface which, as a result, sets up a positive frictional condition between the tape and capstan. Since the R. P. M. of the capstan is much slower than that of the takeup reel and its associated parts, the resistance set up by the capstan causes the diaphragm (72) of the clutch assembly to slip a corresponding amount. This

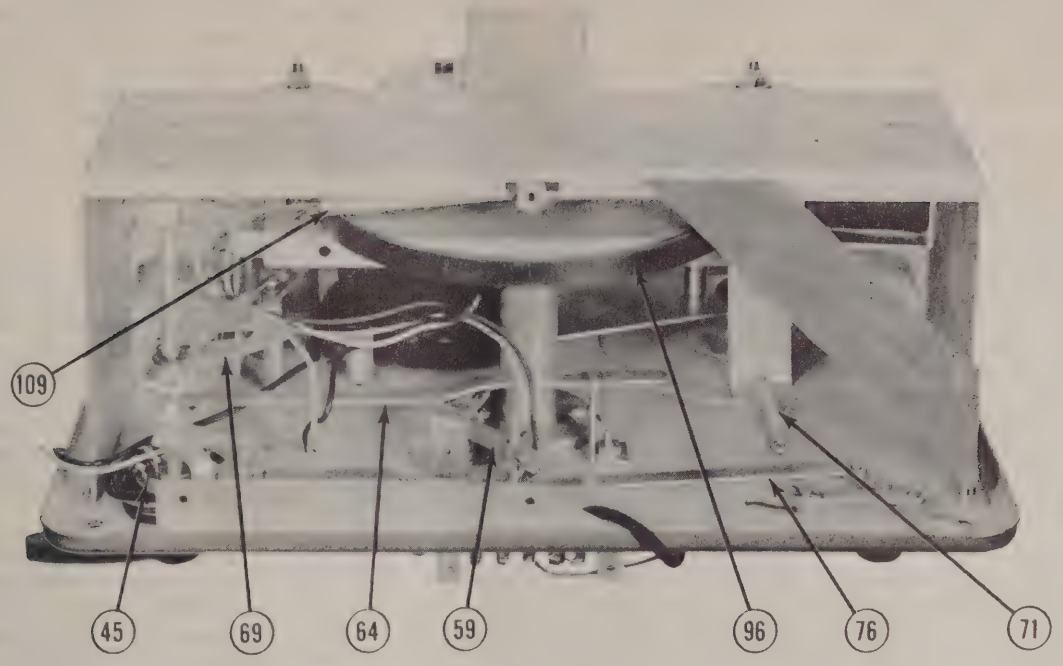


Figure 4

accounts for the highspeed winding when this friction condition is released at the time the control knob (18) is turned to the "Tape Out" or "Load or Rewind" position.

(b) The Revers-A-Matic sticker is placed on the back of the tape wherever the customer desires; therefore, with the unit operating in a forward position, the metallic coating contacts the reversing switch (15) and shorts it. This energizes the solenoid which switches the mechanism from "Forward" to "Reverse".

Fast Speed Winding:

Fast speed winding may be accomplished by turning the control knob (18) to the "Tape Out" or "Load or Rewind" position. This action removes the drag set up between the tape and capstan (7) allowing the clutch assembly to operate without slipping. Reversing the direction of the tape at high speed may be done at will without spillage of the tape. Non-spilling of the tape is credited to the brake assembly (102), (104), and (112). Pressure is applied to clutch assemblies (74), by the brake assembly, as the control knob (16) passes the neutral or "Off" position when it is switched from "Forward" to "Reverse", or vice versa. This neutral position of the control assembly stops the reels instantly, preventing any overrun of the reels. Because the braking action is applied to the reels through the clutches, tape breakage is minimized.

To Repair or Slice Tape:

In case the tape is broken accidentally, or it is desired to edit the recording, a splice may be made special with "Scotch" S-41 Splicing tape. Do not use medical adhesive tape as the adhesive material is not suitable for this purpose. The "Scotch" Splicing tape should be applied to the reverse, or uncoated, side of the recording tape. To assure proper operation of the unit, the edges of the splice should be trimmed with a small pair of scissors, or a knife, to bring the width of the splice to that of the rest of the recording tape or slightly less.

It is recommended not to use a lubricated tape as it may slip on the rubber capstan (7) causing "Wow" in the recorded sound. Consult your dealer for a list of approved tapes.

Cleaning Recording Head:

After the recorder has been in use for some time, the many thousands of feet of tape passing over the magnetic heads may have deposited a film of gum, dust and dirt on the magnetizing section. This film will reduce the efficiency of the recorder.

To clean this film from the three magnetic heads, remove the three screws (2) and the housing (3). Now, set the control lever (18) in position halfway between "Record or Play" and "Load or Rewind." This will place the recording magnet at the edge of the slot. Moisten a clean cloth with carbon tetrachloride and gently rub the surfaces of the recording heads. The capstan tire surface should also be cleaned with carbon tetrachloride, holding a moistened cloth against the neoprene surface with the machine running. Replace housing and screws.

MECHANICAL OPERATION AND ADJUSTMENTS

Forward Pulling Spring Adjustment:

The proper motor pressure applied to the main drive wheel (96), when in the "Forward" position, is adjusted by means of the "Flexloc" nut on the spade screw (65), located on the cam follower assembly (63). Measure this pressure with spring scale hooked on the rear lip of the right-hand motor support bracket (40) as close to the motor as possible. With the motor

running in the "Forward" position, pull the spring scale back until the capstan (7) slips; then read the scale. Pressure measured with tape loaded and running should be 4 1/2 to 5 lbs. Adjust the "Flexloc" nut until the proper pressure is obtained.

Rear Idler Wheel Adjustment:

With the motor running in "Reverse" direction, the rear idler wheel and bracket (101) is adjusted by loosening the two mounting screws (110A), figure 4, and sliding the bracket to the left (facing the rear of the machine) until the cam follower (63) has approximately 1/16" slack. The idler wheel must be horizontally aligned with the main drive wheel (96) for proper performance. Be sure the adjusting screws are tight after the adjustment is made; check to be sure that rear idler wheel does not contact the neoprene oil catcher on the motor shaft while operating.

Clutch Adjustment:

The clutch assemblies (diaphragm and hub assemblies (72), and clutch wheel (74) slip relative to each other due to the speed difference between the capstan and the clutch assembly. The friction between tape and capstan produces the drag forcing the clutch to slip; however, when this friction is removed by turning the control knob (18) to "Tape Out", there should be enough friction in the clutch assemblies to drive the reels at high speed. The following procedure is necessary to check and adjust the clutch assembly. With the motor running, check the pressure of the clutch with a spring scale hooked on to the reel at approximately a 3" radius and held at right angles to the reel spoke. Correct adjustment should read 3 1/2 to 4 1/2 oz. The clutch pressure is varied by adjusting the "Flexloc" nut (85).

Brake Shoe Adjustment:

The brake shoes (102) must be adjusted to stop the reels immediately when the control knob (16) is placed in the neutral or "Off" position.

The brake shoes (102) are adjusted by loosening the screw which secures them to the brake arm assembly (112). With the machine in a neutral position, move the brake shoe in to contact the clutch wheel firmly; then tighten the screw.

Brake pressure applied to the clutch wheel should be just enough to stop the reels immediately; too great a pressure may cause the shoes to drag on the clutch wheels while in playing position.

Tape Level Adjustment:

With the tape loaded and running, and with the control knob (18) in the "Tape In" or "Play or Record" position, the edge of the tape should run approximately 1/32" above the bottom edge of the capstan rubber (7) in both directions. To adjust the tape position as required carefully bend the tape arms (22) and (23) until proper adjustment is obtained.

Pressure Pads:

The pressure pads (13) apply just enough pressure to the tape to hold them against the erase heads (24). The pressure pads should be depressed approximately 1/8" when the mechanism is in playing position ("Tape In" or "Play or Record"), and should be vertical and flat against the erase heads. The pressure pads are adjusted by loosening their mounting screws (13B) and rotating pads to correct position; then tighten screws. If a high frequency mechanical noise is heard when the tape is running, this may be damped out by adding adhesive tape to the rear surface of the pressure pad assembly (13).

Automatic Reverse Adjustment:

The solenoid (111) should be adjusted so that the machine will cycle automatically, from "Forward" to "Reverse", every time the reversing switch (15) is actuated. To adjust the solenoid, remove the power plug, turn the control knob (16) to "Forward" position, and loosen the screws holding the solenoid bracket to the mounting base. Adjust the solenoid so that the end of the plunger is approximately 1/32" from the rubber bumper on the end of the brake driving link; tighten the screw.

The spring (80) and bracket (78) must also be adjusted properly to assure definite reversing operation. The spring and bracket, which hold the self-energizing wheels (90) in contact with the clutch wheel (74), help to switch the oscillating bracket (88). Adjust the spring so that it is vertical in respect to the head lifting link (64) when the machine is in the "Off" position. In late production, two of these springs (80) are used. This is to give a more positive or definite reversing action to the mechanism.

TROUBLES

Failure to Reverse Automatically:

1. Check power source 6.3 volts by shorting the reversing switch (15). Short metal rings of the switch (15) and listen for hum in solenoid (111).

2. Excessive brake pressure. See "Brake Shoe Adjustment".

3. Solenoid out of adjustment, thereby not actuating the brake driving link (104). See "Automatic Reverse Adjustment".

4. Spring (80) broken or out of adjustment. See "Automatic Reverse Adjustment".

5. Check mechanism for binding parts.

Machine Shuts off at End of Tape Instead of Reversing Operation:

1. Spring (44A) loose, thereby not pulling the motor and bracket assembly around, leaving the switch in the neutral or "Off" position.

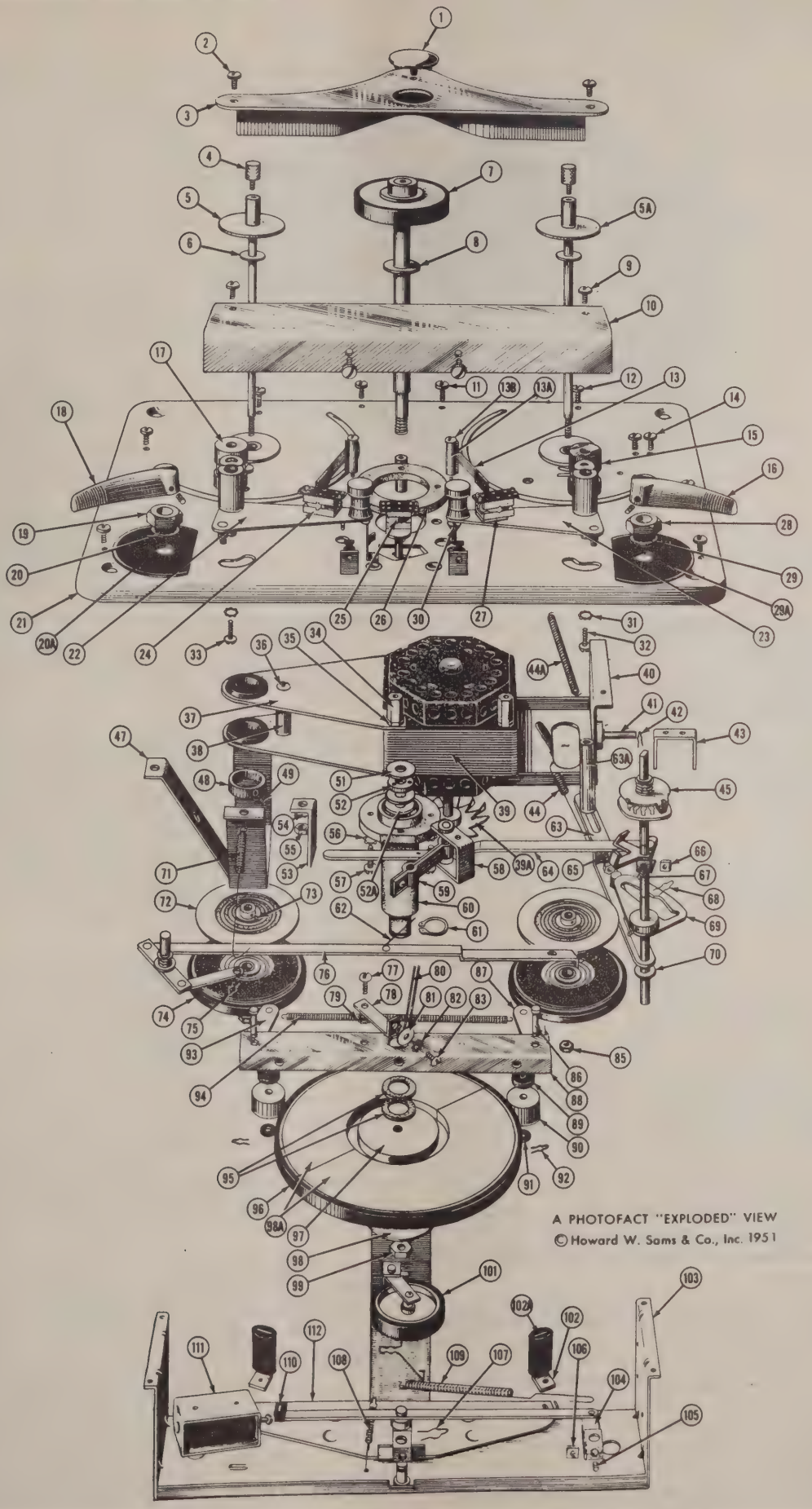
2. Check for binding parts.

3. Check metallic coating on back of tape.

Speed Variation or Wow:"

1. Check the motor shaft, driving wheels (90), clutch wheels (74), main drive wheel (96), and rear idler (101), for oil and foreign material. Clean with carbon tetrachloride.

2. Brake pressure adjustment too great. If this is true, the brake shoes may drag on the clutch wheels (74). See "Brake Shoe Adjustment".


A PHOTOFACT "EXPLODED" VIEW
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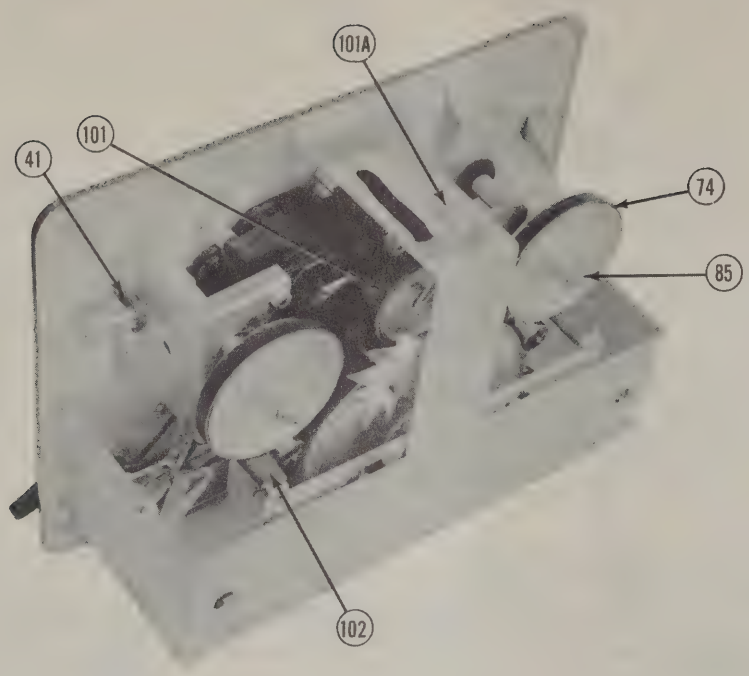


Figure 5

3. Spring (108) loose, leaving the brake arm in a forward position. If this condition exists, it may allow the brake shoes to drag on the clutch wheels (74). It also prevents the machine from winding at high speed, producing a loud hum due to this drag.

4. Tape arm spring (71) loose. If this is true, the erase heads are not held in their play position, which results in the tape not being held in constant contact with the capstan (7).

5. Spring (80) loose; this, as a result, lessens the pressure of the self-energizing wheels (90) against the clutch wheels.

Failure to Erase:

1. Tape arm spring (71) loose. If this is true, the laminations of the erase heads will not be held in a positive position against the tape.

2. With the tape running in the "Forward" position, the top of the laminations on the right-hand erase head should be level with top edge of the tape. The top of the recording head laminations (25) should be 1/64" below the top of the tape.

3. With the tape running in the "Reverse" position, the bottom of the left-hand erase head laminations is level with the bottom of the tape. The recording head in "Reverse" position should be 1/64" above the lower edge of the tape.

4. Pressure pads (13) out of adjustment. See adjustment on "Pressure Pads".

5. Check resistance of erase head . . . should be approximately 160 ohms. Check voltage source.

Failure to Record:

1. Tape arm spring (71) loose . . not holding recording head (25) against tape.

2. Spring of the recording head bracket and clamp assembly (58 and 59) broken.

3. Laminations on the recording head dirty. The laminations of the recording head (25) and the erase heads (24) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes the heads. This must be periodically removed since it will cause distortion. This accumulation may be removed with carbon tetrachloride and a small cotton swab on the end of a toothpick. Be careful not to mar the laminations as they should be smooth to operate properly. (See Paragraph on "Cleaning Recording Head").

CAUTION: Do not tamper with the adjustment of the Recording Head, as it is a critical adjustment and has been correctly positioned at the time of manufacture. If, however, head replacement is necessary refer to the following.

Replacement or Realignment of Record Head

The record-playback head in the PT-3 unit has been adjusted at the factory for perfect alignment. This assures that the gap in the head is perpendicular to the edge of the tape and is parallel to face of the tape and capstan.

If due to excessive wear of the contact surface of the head laminations, head replacement is indicated, the head being symetrical front to back, may be removed and turned around 180°. This provides twice the life of a single face head.

If a head is found to be open or shorted when checked with an ohmmeter it must be replaced. With the red and black lead wires removed from head the resistance of entire head (both coils) should be approximately 160 ohms or 80 ohms from each terminal to connecting link (one coil). No reading

should exist from any terminal to frame.

Procedure:

To replace head, remove red and black wires from terminal panel on top of head, then remove 4 corner screws. Do not distrub 2 center screws as they hold the head assembly together. If head is to be turned around for use of rear side, remove piece of metal cemented to back surface of head frame if present. This is applied for hum bucking and must be replaced on the rear of head after it is reconnected and adjusted.

New head or reversed head may now be placed back on head platform and 4 screws replaced in corner holes. Do not completely tighten these screws at this time. Replace red and black leads to head terminals. A tape with a 5000 cycle tone recorded precisely perpendicular to the edge must be used for alignment. (This tape is available from Service Dept).

With alignment tape loaded in PT-3 machine in normal manner and a suitable output meter in amplifier circuit, the head must now be rocked from side to side by means of the mounting screws. The head platform has a raised dimple in the center and the head will move from side to side and from front to back by successively loosening and tightening the four mounting screws. The output meter will read maximum when the head is in exact line with the recording on the tape. When this is a attained the head is in perfect alignment and screws may be secured with household cement to prevent any further movement of the head.

Hum Bucking

This process minimizes the effect that the magnetic field of the motor has on the recording head. Hum bucking is accomplished by strategically locating a small piece of Mu-metal on the rear side of the recording head. Hum bucking should be done with PT-3 unit, amplifier and power transformer in the final operating position.

Procedure:

With the red motor positioning post in place so that the capstan does not turn, turn left hand control knob (18) to "Play or Record" position, then turn right hand knob (16) to "Reverse" position. The head will be in its operating position without movement of the capstan which might be damaged without tape.

Insert a suitable output meter across the speaker so that a reading can be taken along with a listening test. If PT-3 tape recorder is used with a C1A Reelest Amplifier, set volume control at the tap. The tap can be located by finding the position of the control where the tube hiss and hum are at a minimum in the speaker and on the meter.

With the motor running hold Mu-metal piece flat against the top casting of the record head just below the terminal panel. Move Mu-metal piece back and forth from the center gap in the lamination until the hum in speaker and the output meter is at a minumum. Cement Mu-metal piece at this place.

LUBRICATION

Lubrication applied at time of manufacture is sufficient for a long period of time; however, due to excessive use or high-operating temperatures, lubrication should be applied in the following manner:

Use Sta-Put on the Following:

1. Felt washer under reel platform.

2. Washers (51) and ball race (52) of the capstan shaft.

3. Cam roller and all sliding contact surfaces of the cam (69) and cam follower (63).

4. Sliding contact areas of the brake arm sembly and all movable link assemblies.

5. Head lifting link guide bracket (53).

Use Light Spindle Oil on the Following:

1. Head lifting bracket bearing (58).

2. Roller and shaft of the brake arm and roller assembly.

3. Felt pads (89) of the self-energizing idler wheels (90). The felt pads on the clutch wheel face to be lubricated with powdered graphite.

CAUTION: Avoid overlubrication; this may cause parts to stick or failure of the machine to operate properly.

Do not oil the motor shaft or any of the rubber surfaces of the various wheels. Oil at these points may cause speed variation or "Wows."

In summary, it is suggested that the following procedure be followed for checking a PT-3 Recorder mechanism:

1. With an amplifier properly connected to the PT-3 unit supplying bias, erase, and solenoid voltages, place a roll of tape on the right hand reel platform and thread for proper operation.

2. Start machine by placing right hand lever in forward position.

3. Stall right hand reel for check on capstan driving power. Left hand lever should move forward showing that the friction between capstan and tape is correct. If left hand lever does not move, residue is present on capstan and should be removed with carbon tetrachloride or equivalent. Repeat above on left hand reel with right hand lever in reverse.

4. If tape has a tendency to form a loop between the capstan and the moving tape guides, tape is too wide. Wide tape may be returned to dealer for credit.

An A. C. Vacuum tube voltmeter with high resistance input should be used. (Vomax or equivalent) A fibre padding screw driver should be used for adjusting. Oscillator padder is nearest 6SN7 tube and Erase padder is nearest 6V6 tube.

1. Turn oscillator padder and erase voltage padder all the way in a clockwise direction, then back off in a counter clockwise direction 4 or 5 turns. Remove front bezel and connect Vacuum tube Voltmeter

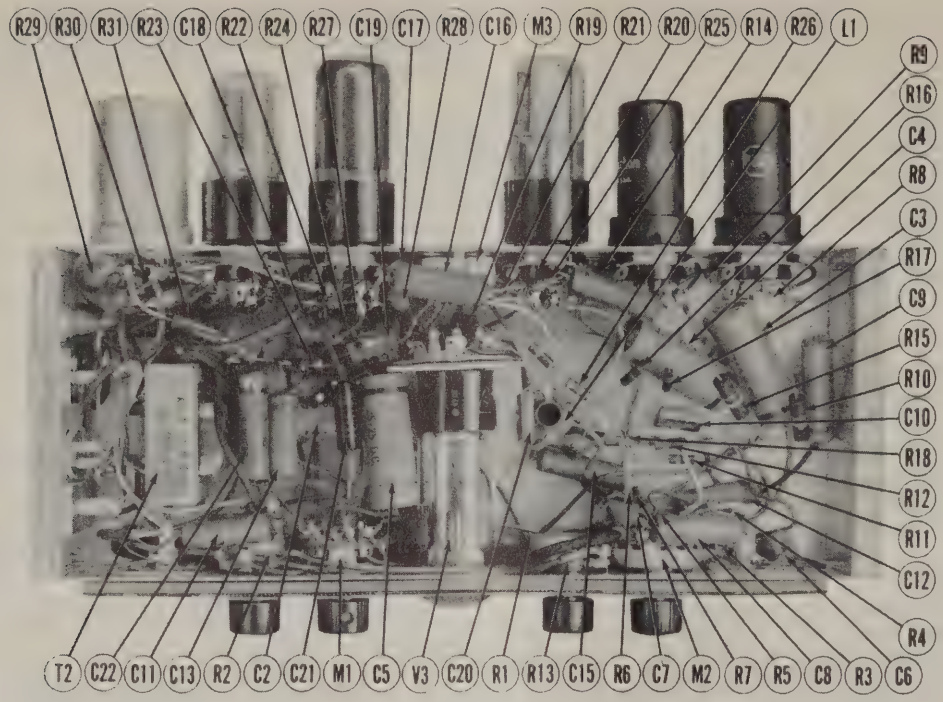


Figure 6

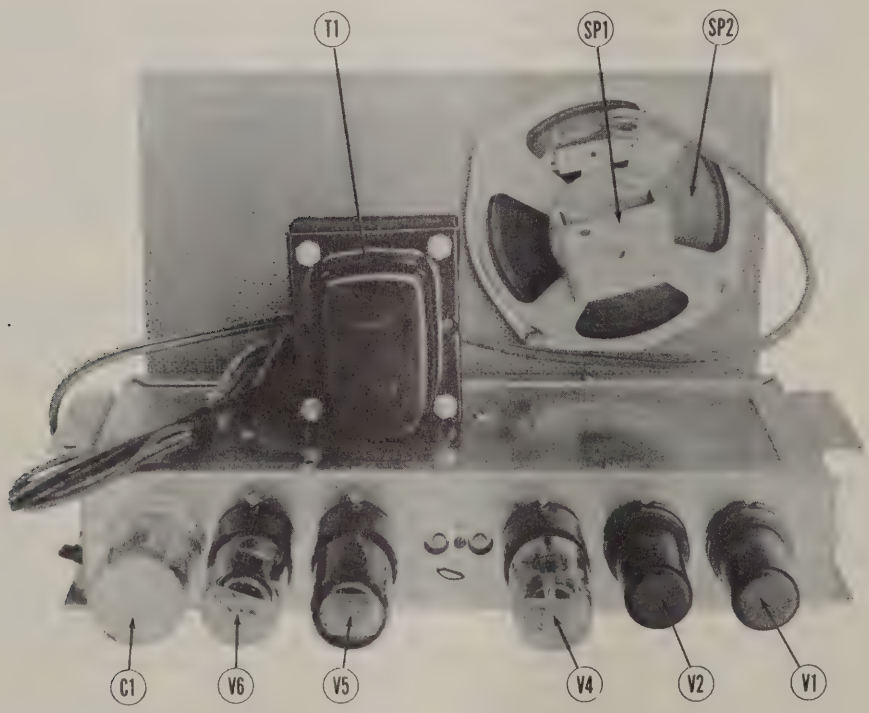
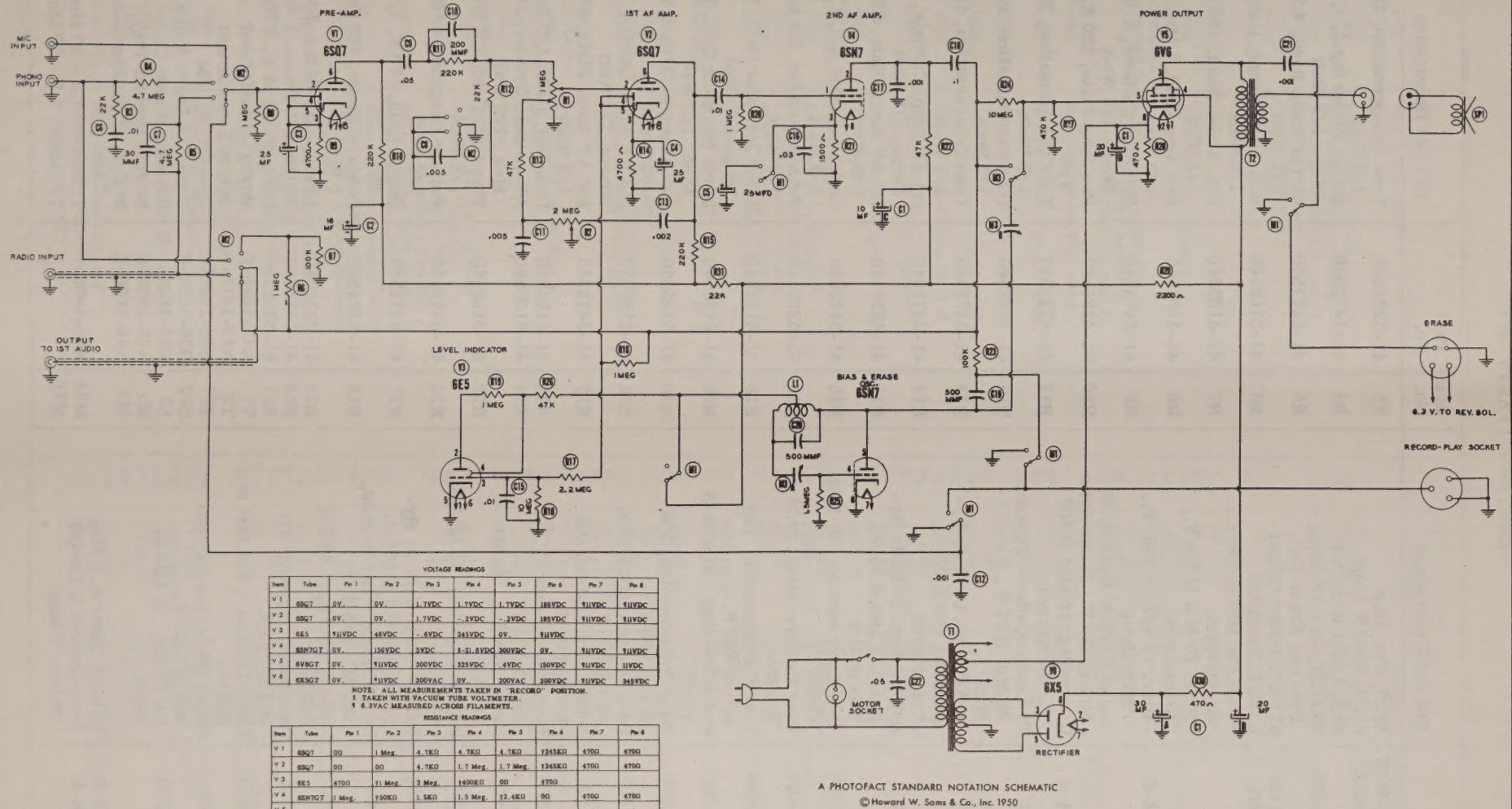


Figure 7

to recording head terminals which are on the extreme left hand end of front terminal strip. The high side of V. T. V. M. should be connected to the red lead. Use 120 V. A. C. scale.

Gradually rotate oscillator padder clockwise until meter starts to read. Continue turning padder until a maximum reading is obtained. This is the proper adjustment (approximately 90 V. A. C.). If padder is turned beyond this point, oscillator voltage will fall off and result in poor wave form.

2. Connect V. T. V. M. ground side to extreme right hand terminal on terminal strip which is ground side of erase circuit. Connect high side of V. T. V. M. to yellow lead terminal. With right hand control lever in either direction so that an erase head is connected for a load, rotate erase padder clockwise. On the 300 volt ac scale, meter should read full 300 volts.



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SQ7	0V.	0V.	1.7VDC	1.7VDC	1.7VDC	105VDC	¶11VDC	¶11VDC
V 2	6SQ7	0V.	0V.	1.7VDC	-.2VDC	-.2VDC	105VDC	¶11VDC	¶11VDC
V 3	6E5	¶11VDC	46VDC	-.6VDC	245VDC	0V.	¶11VDC		
V 4	6SN7GT	0V.	150VDC	5VDC	1-21.5VDC	300VDC	0V.	¶11VDC	¶11VDC
V 5	6V6GT	0V.	¶11VDC	300VDC	325VDC	4VDC	150VDC	¶11VDC	11VDC
V 6	6X5GT	0V.	*11VDC	300VAC	0V.	300VAC	300VDC	¶11VDC	345VDC

NOTE: ALL MEASUREMENTS TAKEN IN "RECORD" POSITION.
‡ TAKEN WITH VACUUM TUBE VOLTMETER.
¶ 6.3VAC MEASURED ACROSS FILAMENTS.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SQ7	0Ω	1 Meg.	4.7KΩ	4.7KΩ	4.7KΩ	†245KΩ	470Ω	470Ω
V 2	6SQ7	0Ω	0Ω	4.7KΩ	1.7 Meg.	1.7 Meg.	†245KΩ	470Ω	470Ω
V 3	6E5	470Ω	11 Meg.	3 Meg.	†400KΩ	0Ω	470Ω		
V 4	6SN7GT	1 Meg.	†50KΩ	1.5KΩ	1.5 Meg.	†2.4KΩ	0Ω	470Ω	470Ω
V 5	6V6GT	0Ω	470Ω	†850Ω	†470Ω	400KΩ	†40KΩ	470Ω	470Ω
V 6	6X5GT	Inf.	470Ω	480Ω	Inf.	480Ω	42KΩ	470Ω	55KΩ

† MEASURED FROM PIN 8 OF V6.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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REELEST
MODEL C1A

Item No.	Part No.	Use and Description
V1	46-6SQ7-MET.	6SQ7, Pre Amp.
V2	46-6SQ7-MET.	6SQ7, 1st AF Amp.
V3	46-6E5	6E5, Level Indicator
V4	46-6SN7-GT.	6SN7GT, 2nd AF Amp. - Bias and Erase Osc.
V5	46-6V6-GT.	6V6GT, Power Output
V6	46-6X5-GT.	6X5GT, Rectifier
C1A		Filter, 30 Mfd @ 400 V., Electrolytic
C1B		Filter, 20 Mfd @ 350 V., Electrolytic
C1C	A38-1003-B	Filter, 10 Mfd @ 350 V., Electrolytic
C1D		Output Cathode Bypass, 20 Mfd @ 250 V., Electrolytic
C2	A38-1004-A	Decoupling, 16 Mfd @ 300 V., Electrolytic
C3	A38-1001	Pre Amp. Cathode Bypass, 25 Mfd @ 25 V., Electrolytic
C4	A38-1001	1st AF Amp. Cathode Bypass, 25 Mfd @ 25 V., Electrolytic
C5	A38-1001	2nd AF Amp. Cathode Bypass, 25 Mfd @ 25 V., Electrolytic
C6	37-01004000	Tone Compensation, 01 Mfd @ 600 V.
C7	39-00306400	Tone Compensation, 30 Mmf @ 500 V.
C8	37-00504400	Tone Compensation, .005 Mfd @ 600 V.
C9	37-05004000	Audio Coupling, .05 Mfd @ 400 V.
C10	39-10206400	Tone Compensation, 200 Mfd @ 500 V.
C11	37-00504400	Tone Compensation, .005 Mfd @ 600 V.
C12	37-00102000	Tone Compensation, 001 Mfd @ 600 V.
C13	37-00204000	Tone Compensation, .002 Mfd @ 600 V.
C14	37-01004000	Audio Coupling, .01 Mfd @ 600 V.
C15	37-01004000	Indicator Filter, .01 Mfd @ 600 V.
C16	37-03002000	2nd AF Amp. Cathode Bypass, .03 Mfd @ 400 V.
C17	37-00102000	2nd AF Amp. Plate Bypass, .001 Mfd @ 600 V.
C18	37-10004000	Audio Coupling, .1 Mfd @ 400 V.
C19	39-10206400	Oscillator Coupling, 500 Mfd @ 500 V.
C20	39-10206400	Fixed Trimmer, 500 Mfd @ 500 V.
C21	37-00109000	Output Plate Bypass, .001 Mfd @ 1000 V.
C22	37-05004000	Line Filter, .05 Mfd @ 400 V.
R1	A42-1003-B	Volume Control, 1 Meg.
R2	A42-1004-B	Tone Control & On-Off Switch, 2 Meg.
R3	41-3223540	Tone Compensation, 22K, 1/2 Watt
R4	41-5473540	Series Phono Input, 4.7 Meg., 1/2 Watt
R5	41-5473540	Series Radio Input, 4.7 Meg. 1/2 Watt
R6	41-5103540	Ext. Audio Shunt, 1 Meg., 1/2 Watt
R7	41-4103240	Ext. Audio Shunt, 100 K, 1/2 Watt
R8	41-5103540	Pre Amp Grid, 1 Meg., 1/2 Watt
R9	41-2473540	Pre Amp Cathode, 4700 Ohms, 1/2 Watt
R10	41-4224540	Pre Amp Plate, 220 K, 1 Watt
R11	41-4223540	Tone Compensation, 220 K, 1/2 Watt
R12	41-3223540	Tone Compensation, 22 K, 1/2 Watt
R13	41-3473540	Tone Compensation, 47 K, 1/2 Watt
R14	41-2473540	1st AF Amp. Cathode, 4700 Ohms, 1/2 Watt
R15	41-4224540	1st AF Amp. Plate, 220 K, 1 Watt
R16	41-5103540	Level Indicator Net, 1 Meg., 1/2 Watt
R17	41-5203540	Voltage Divider, 2.2 Meg., 1/2 Watt
R18	41-6103540	Level Indicator Grid, 10 Meg., 1/2 Watt
R19	41-5103540	Level Indicator Grid, 1 Meg., 1/2 Watt
R20	41-5103540	2nd AF Amp. Grid, 1 Meg., 1/2 Watt
R21	41-2153540	2nd AF Amp. Cathode, 1500 Ohms, 1/2 Watt
R22	41-3473540	2nd AF Amp. Plate, 47 K, 1/2 Watt
R23	41-4103240	Isolation, 100K, 1/2 Watt
R24	41-6103540	AF Voltage Divider, 10 Meg., 1/2 Watt
R25	41-5153540	Vias Osc. Grid, 1.5 Meg., 1/2 Watt
R26	41-3473540	Voltage Dropping, 47 K, 1/2 Watt
R27	41-4473540	Output Grid, 470 K, 1/2 Watt
R28	41-1474540	Output Cathode, 470 Ohms, 1 Watt
R29	41-2225540	Filter, 2200 Ohms, 2 Watt
R30	41-1475540	Filter, 470 Ohms, 2 Watt
R31	41-3225540	Decoupling, 22 K, 2 Watt
T1	A43-1010-B	Power Transformer
T2	A43-1011-B	Output Transformer
SP1	B36-1004-C	Speaker, 5 PM
SP2	B36-1004-C	Cone, 3.8 Ohms Voice Coil
L1	B35-1004-1-C	Bias Oscillator Coil
M1	A45-1007-C	Switch, Record-Play
M2	A45-1008-C	Switch, Mike-Phono-Radio-Tape
M3A	A40-1002	Trimmer, 7.5 - 50 Mmf
M3B		Trimmer, 7.5 - 50 Mmf

Ref. No.	Part No.	Description
1	33-1042	Plug Button-Bezel
2	1H10796FA7	Screw
3	25-1415	Rear Bezel
4	25-1262	Reel Retaining Screw
5	27-1034	Reel Shaft & Platform Assy.
5A	27-1034	Reel Shaft & Platform Assy. *
6	21-1004	Reel Shaft Washer
7	27-1054	Capstan Assembly
8	21-1003	Cork Washer
9	1H10796FA7	Screw
10	25-1277	Front Bezel
11	1H20525FA7	Screw
12	1H20525FA7	Screw
13	27-2088	Pressure Pad Assembly
13A	33-1034	Spacers
13B	1H20274FA-1	Screws
14	1H20523FA-7	Motor Support Bracket Screws
15	27-2178	Reversing Switch Assembly (Added 27-2178 as service Pt. No. Only)
15A	21-1053	Reversing Switch Base (Part of 27-2178)
15B	21-1054	Reversing Switch Post (Part of 27-2178)
15C	25-1420	Reversing Switch Washer (Part of 27-2178)
15D	21-1026	Reversing Switch Insulator (Part of 27-2178)
15E	33-1030	Reversing Switch Lug (Part of 27-2178)
16	21-1023	Control Knob (Two set Screws Included)
17	25-1414	Guide Post- Left Hand
18	21-1023	Control Knob
19	25-1502	Nut
20	1H24520FA-1	Lockwasher
20A	29-1004	Escutcheon - L. H. Knob *
21	27-1028	Motorboard Assembly
22	27-1046-1	L. H. Tape Arm Assembly
23	27-1046	R. H. Tape Arm Assembly
24	43-1005	R. H. & L. H. Erase Head Assembly
	2H10564	Screws for R. H. Erase Heads
	1H24510FA1	Lockwasher for R. H. & L. H. Erase Heads
	2H10563	Screws for L. H. Erase Heads
25	43-1006	Recording Head
26	25-1254	Capstan Bearing Housing Ring
27	25-1474	Spacer for Right Hand Erase Head
28	25-1502	Nut
29	1H24520FA1	Lockwasher
29A	29-1005	Escutcheon - R. H. Knob *
30	1H10245FA1	Screw
31	1H24256FA1	Lockwasher
32	1H10618FA1	Screw
33	1H10611FA1	Screw
34	25-1510	Shipping Nut (Part of Motor Assembly - Item 39)
35	1H24258FA1	No. 10 Lockwasher (Part of Motor Assembly - Item 39)
36	1H10646FA1	No. 8-32 Screw (Part of Motor Assembly - Item 39)
37	27-2103	Mounting Plate Assembly (Part of Motor Assembly - Item 39)
38	25-1401	Spacer (Part of Motor Assembly - Item 39)
39	27-2083	Motor Assembly (Includes Items 34-35-36-37-38-40-46-& 50)
39A	25-1590	Fan Assembly (Including Set Screw) *
40	25-1382	Mounting Plate (Part of Motor Assembly - Item 39)
41	25-1385	Motor Support Wheel Shaft
41A	27-1032	Motor Support Wheel
42	33-1002	Hairpin Clip
43	25-1383	Motor Support Wheel Bracket
44	33-1005	Cam Spring
44A	33-1006	Motor Spring
45	45-1005	Motor Switch
46	1H24257FA1	No. 8 Lockwasher (Part of Motor Assembly - Item 39) -- This part not shown in exploded view.
47	27-1055	Reel Shaft Housing Tripod
48	25-1342	Motor Collar
49	1H25849FE-6	Set Screw
50	1H20519FA1	No. 8-32 Hex Nut (Part of Motor Assembly - Item 39) This part not shown in exploded view.
51	25-1409	Hardened Bearing Washers
52		Capstan Thrust Bearing
	21-1021	Bakelite Retainer
	25-1410	Ball Bearings
52A	21-1003	Cork Washer
53	25-1423	Head Lifting Link Guide Bracket
54	1H24257FA1	Lockwasher
55	1H20248FA1	Nut
56	1H24256FA1	Lockwasher
57	1H10615FA1	Screw
58	27-2047	Head Bracket & Clamp Assembly
59	27-1063	Clamp Assembly (Part of Item 58)
60	31-1008	Capstan Bushing
61	33-1040	Truarc Retaining Ring
62	33-1008	Head Retracting Spring (Part of Item 76)
63	27-1058	Cam Follower Assembly
63A	25-1450	Cam Follower Guide Post
64	27-1081	Head Lifting Link
65	1H42676FA1	Spade Bolt
66	33-1032	Nut
67	1H25881FE26	Set Screw
68	33-1004	Hairpin Clip
69	27-2102	Cam
70	21-1004	Washer
71	33-1022	Tape Arm Spring
72	27-2107	Diaphragm & Hub Assembly
73	1H25848FE6	No. 6-32 Set Screw
74	27-1025	Clutch Wheel Assembly
75	33-1002	Hairpin Clip
76	27-1044	Tape Arm Link & Spring Assembly
77	1H21297FA1	Screw
78	25-1464	Oscillating Bracket for Vertical Spring
79	1H24256FA1	Lockwasher
80	33-1020	Oscillating Bracket Return Spring
81	1H52148FA1	Plain Washer
82	1H24256FA1	Lockwasher
83	1H21297FA1	Screw
84	25-1407	Clutch Adjusting Nut
85	25-1407	Clutch Adjusting Nut
86	25-1381	Self-Energizing Shaft
87	27-1047	Self-Energizing Bracket - R. H.
88	25-1378	Oscillating Bracket
89	21-1066	Felt Washer (Part of 27-1047)
90	27-1039	Self-Energizing Wheel (Part of 27-1047)
91	21-1020	Felt Washer (Part of 27-1047)
92	33-1002	Hairpin Clip (Part of 27-1047)
93	27-1040	Self-Energizing Bracket - L. H. (Includes same parts as 27-1047 - Item 87)
94	33-1027	Spring
95	21-1003	Cork Washers
96	27-1024	Main Drive Wheel Assembly
97	25-1523	Hub
98	1H52581FA1	Washer .266 I. D. x 1-3/4 O. D.
98A	25-1562	Fly wheel Halves
99	25-1509	Nut - Flexloc
101	27-1037	Idler Wheel & Bracket Assembly
102	25-1404	Brake Shoe - Metal (Part of Item 112)
102A	21-1107	Brake Shoe - Rubber (Part of Item 112)
103	27-2104	Brake Arm Support Assembly
104	27-1042	Brake Roller Assembly
105	1H25849FE6	Set Screw
106	33-1032	Nut
107	33-1004	Hairpin Clip
108	33-1003	Brake Spring
109	33-1046	Spring - Auxiliary
110	21-1079	Bumper - Solenoid
111	27-1071	Solenoid

*Newly Added